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THE

NATURAL HISTORY

OF

PLANTS.

VOL. IV.

THE

NATURAL HISTORY

OF

PLANTS.

BY

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VOL. IV.

NYCTAGINACEÆ, PHYTOLACCACEÆ, MALVACEÆ,
TILIACEÆ, DIPTEROCARPACEÆ, CHLÆNACEÆ, TERNSTRŒMIACEÆ,
BINACEÆ, CISTACEÆ, VIOLACEÆ, OCHNACEÆ, RUTACEÆ.

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NATURAL HISTORY OF PLANTS.

XXIV. NYCTAGINACEÆ.

The Marvels of Peru (Fr., *Belle-de-nuit*;[1] figs. 1–10) have regular hermaphrodite flowers. Their convex receptacle bears below a first

Mirabilis Jalapa.

Fig. 1.—Floriferous branch ($\frac{2}{3}$).

[1] *Mirabilis* L., *Gen.*, n. 139.—Gærtn., *Fruct.*, ii. 207, t. 127.—Lamk., *Dict.*, iv. 481; Suppl., iv. 84; *Ill.*, t. 105.—Endl., *Gen.*, n. 2003.—Duchartre, in *Ann. Sc. Nat.*, sér. 3, ix. 263,

floral envelope, green, analogous to a calyx, with five divisions more or less deep quincuncially imbricated, or almost valvate. More internally is found a second coloured[1] petaloid envelope, with a tube more or less elongated according to the species, dilated at the base into a kind

Mirabilis Jalapa.

Fig. 2.
Bud.

Fig. 3.
Flower.

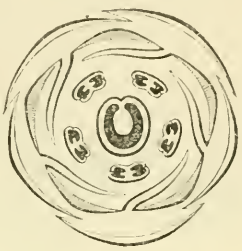

Fig. 4.
Diagram.

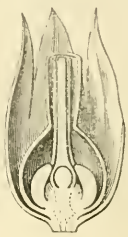

Fig. 5.
Base of the flower, longitudinal section ($\frac{3}{1}$).

of sac, and spreading out above into a funnel-shaped limb, of which the five divisions are deeply induplicate-contorted.[2] The androceum is formed of five stamens, alternating with the divisions of the inner envelope. They are generally of unequal length, each composed of a filament, free in all its upper portion, surmounted by a bilocular introrse anther, with two cells dehiscing by longitudinal submarginal clefts.[3] Below, these filaments sometimes adhere to the tube of the perianth, and, quite at their base, unite into a short thick tube, fleshy in certain species, and more or less urceolate and glandular.[4] This

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t. 17–19.—Choisy, in *DC. Prodr.*, xiii. sect. ii. 427. — Payer, *Organog.*, 297. — *Admirabilis* Clus., *Hist.*, ii. 87.—*Nyctage* V. Roy., *Lugd.*, 417.—*Jalapa* T., *Inst.*, 129, t. 50.—Adans., *Fam. des Pl.*, ii. 265.—*Nyctago* J., *Gen.*, 90; in *Ann. Mus.*, ii. 274 (incl.: *Acleisanthes* A. Gray, *Quamoclidion* Chois.).

[1] White, pink, violet purple yellowish, or spotted with these different colours.

[2] The lobes, properly speaking, are but slightly prominent. Their midrib corresponds to the five projecting ribs found all along the perianth, and ending in a more or less acute little point. It is between these apices that the limb expands into five petaloid laminæ, which are reduplicate-contorted in the bud (often wrongly described as lobes of the calyx) while the real body of the petal is valvate.

[3] The pollen-grains are large and spherical. Their outer coat is "firm, punctate with many pores" (H. Mohl, in *Ann. Sc. Nat.*, sér. 2, iii. 313). "*Pollen granulosum luteum*" (Chois., *Prodr.*, 426).

[4] Often described, for this reason (but wrongly), as a disc, this organ is quite independent of the hypogynous disc, which is represented in several species by a slight thickening of the base of the ovary itself.

part of the androceum surrounds a free, superior, unilocular ovary, thickened at the base into a hypogynous disc,[1] surmounted by a long slender style, the capitate apex of which bears a great number of small branches, simple or ramified,[2] each terminated by a little head bearing stigmatic papillæ. Towards the base of the ovary-cell, at the bottom of its posterior wall, is found a subbasilar placenta, which supports a single anatropous ovule, suberect, with the micropyle turned downwards and outwards.[3] The fruit is an achene,[4] with a membranous pericarp surmounted by a vestige of the style, and closely applied to the seed which it encloses. Around it persists the inflated base of the androceum and the dilated portion of the petaloid perianth, which becomes dry, hard, pentagonal (figs. 6, 7), only presenting at its truncated apex a narrow opening at the point where the tubular part is detached after anthesis. Under the very thin seed-coats is found a conduplicate embryo, which envelops by its curved radicle, with inferior apex, and by its two large foliaceous, unequal[5] conduplicate-incumbent cotyledons, a thick farinaceous albumen (figs. 7, 8, 10). The Marvels of Peru are perennial[6] plants of tropical America. Their subterranean portion is tuberous, formed by the tap-root, which is sometimes considerably developed. The herbaceous stems di- or trichotomous, with swollen, articulated nodes, bear opposite, simple petiolate exstipulate leaves. The axillary or terminal flowers are in cymes or

Mirabilis Jalapa.

FIG. 6.
Induviate fruit ($\frac{5}{1}$).

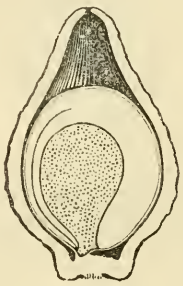

FIG. 7.
Longitudinal section, antero-posterior, of induviate fruit.

[1] Often little developed; its existence is always indisputable in the common Marvel of Peru.

[2] In *M. Jalapa* they are only ramified, as a rule, into two or three short branches.

[3] It has two coats, and its base is very thick; it often forms a projection below the micropyle, which seems to play the part of an obturator.

[4] It might almost be called a caryopsis; however, the membranes which represent, one the pericarp, the other the episperm, are separable, although closely applied to each other.

[5] The exterior is larger than the interior, and this disproportion is very marked in certain other *Nyctaginaceæ*.

[6] With us, they are cultivated as annuals, the winter destroying their aerial branches. But if protected from the frost, their fleshy tap-roots can be preserved from one year to another.

glomerules.[1] Half a dozen species[2] of *Mirabilis* proper are known, some of which are frequently cultivated in our gardens. The exterior green gamophyllus envelope of our common Marvel of Peru is not a calyx, but really an involucre; for in *M. triflora* it contains, instead of a single flower, three, of which one is terminal, and two younger

Mirabilis Jalapa.

FIG. 8.
Fruit with indusium. Longitudinal section (bilateral).

FIG. 9.
Fruit without indusium ($\frac{5}{1}$).

FIG. 10.
Seed, the teguments taken away.

ones lateral. A genus has been made for this plant under the name of *Quamoclidion*.[3] In *M. multiflora*[4] the flowers are still more numerous within the involucre; from four to six may be counted around the terminal flower. In the preceding plants the number of bracts in the involucre varies from four to seven or eight. In some other species of *Mirabilis*, distinguished under the generic name of *Acleisanthes*,[5] there are not more than two, or more rarely three bracts under the articulate flower; and they are besides very small, instead of protecting the entire[6] bud when young. The variable size of these bracts, however, does not permit us to distinguish the three or four known species of *Acleisanthes*[7] otherwise than as a section in the genus *Mirabilis*. Thus constituted,[8] this genus consequently includes, according to us, as many as ten species.

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[1] Often uniparous towards the extremity of the inflorescence.

[2] RHEED., *Hort. Malab.*, x. t. 75 (*Andi-Malleri*).—RUMPH., *Herb. Amboin.*, v. t. 89—L., *Spec.*, 252.—MŒNCH, *Meth.*, 508 (*Jalapa*).—SM., *Exot. Bot.*, i. 43, t. 23.—H.B.K., *Nov. Gen. et Spec.*, ii. 212.—BERTOL., *Hort. Bonon.*, 15, t. 1.—TRAUTV., in *Bull. Sc. Acad. Petersb.*, vi. n. 14.—LEPELL., in *Ann. Mus.*, viii. 481.—BLANCO, *Fl. de Filipp.*, 77.—C. GAY, *Fl. Chil*, v. 205.—DC., *Fl. Fr.*, iii. 425.—CURT., in *Bot. Mag.*, t. 371.—WALP., *Ann.*, v. 721.

[3] CHOIS., *Prodr.* 429, n. 2.

[4] *Nyctaginia? Torreyana* CHOIS., *Prodr.*, 430, n. 3.—*Oxybaphus multiflorus* TORR., in *Ann. Lyc. N.-York*, ii. 237.—*Quamoclidion multiflorum* TORR., ex A. GRAY, *Brief Char. of some new Gen. and Spec. of Nyctag.*, 7, n. 2 (ex *Amer. Journ. Sc.*, 1853, xv.).

[5] A. GRAY, *Brief Char.*, 2.

[6] The articulation of the flower is above them.

[7] A. GRAY, *loc. cit.*, 2, 3.—CHOIS., *Prodr.* 429, n. 2 (*Nyctaginia*).

[8] MIRABILIS sect. 3.
1. *Nyctago* (J.).
2. *Quamoclidion* (CHOIS.).
3. *Acleisanthes* (A. GRAY).

Nyctaginia capitata[1] has the same vegetative organs, the same flowers, and the same fruit as *Mirabilis*, but it has been made into a distinct genus because its flowers are united in great numbers into a terminal false capitulum, in an involucre formed of numerous bracts, and because its stamens and capitate style protrude from the perianth, instead of remaining included. It is a herb of Mexico and Texas.

Okenia hypogæa[2] is a Mexican herb, the glutinous branches of which are prostrate on the sand, and bear terminal solitary flowers, in form like those of *Mirabilis*. But these flowers have from twelve to eighteen stamens, a style peltate and stigmatiferous at the apex, and the fruit surrounded, like that of *Mirabilis*, by an indusium of similar nature, buries itself in the sand to ripen, while the peduncle which supports it bends and lengthens greatly. The involucre surrounding the enlarged portion of the perianth is here formed of three leaves more developed than those of *Acleisanthes*, smaller than those of the true *Mirabilis*, imbricate at first, but afterwards caducous.

In *Pentacrophys Wrightii*,[3] an herbaceous plant from Texas, the terminal or leaf-opposed sessile flowers are constructed almost like those of the preceding genera, but they have an involucre of three subulate bracts, a diandrous androceum, and the base of the perianth, which persists around the fruit, takes the form of a truncated cylinder, traversed lengthwise by five prominent, thick, obtuse ribs, terminated by a glandular swelling. The apex of the indusium presents a small opening into the cavity, which contains a small fruit, formed, in fact, like that of *Mirabilis*.[4]

Selinocarpus[5] has the same organs of vegetation as all the preceding plants, and bracts and flowers like those of *Acleisanthes*, but the androceum is composed of from two to five stamens, and the five ribs of the indusium expand around the fruit into five vertical wings, or into a smaller number of those membranous expansions which make the fruit resemble in form certain *Umbelliferæ*.

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[1] Chois., in *Mem. Soc. Gen.*, xii.; *Prodr.*, 429, n. 3.—*Boerhaavia capitata* Pav., mss. (ex Chois.).

[2] Schiede ex Schltl et Cham., in *Linnæa*, v. (1830), 92.—Chois., *Prodr.*, 449, n. 14.

[3] A. Gray, *Brief Char.*, 4.

[4] In this plant, as in most of the allied genera, there are two sorts of flowers. In some the perianth is quite developed; in others it is arrested sooner or later, and moreover the gynæceum is fertilised in the bud, and becomes a fertile fruit.

[5] A. Gray, *Brief Char.*, 4.

It is this which gives the generic name to these plants, of which two species are found in New Mexico.

Oxybaphus[1] (figs. 11, 12) also only differs from the Marvel of Peru in details of form and in the number of stamens. The gamophyllus and quinquefid involucre is one-flowered in half the species, three-flowered in the other half.[2] The perianth has a short tube, and expands rapidly into a campanulate limb, regular or slightly irregular, folded and caducous. The androceum is formed of three, more rarely four, stamens,[3] often quite protruding on one side of the expanded flower, like the style, which is terminated by a stigmatiferous head (fig. 11). The involucre persists and often becomes membranous and veined round the fruit (fig. 12), which is analogous to that of *Mirabilis*. This genus is formed of fifteen species,[4] for the most part American; one of them however is found in the hilly regions of Eastern India. These are herbs whose vegetative organs are analogous to those of *Mirabilis*, and whose small flowers are united into uniparous cymes. In Western America, from Mexico to Chili, a plant is found, analogous to *Oxybaphus* in aspect, and which is named *Allionia incarnata*.[5] Its flowers, three in number, are placed in an involucre, formed of three bracts, to which they are superposed. They are tetramerous and generally tetran-

Oxybaphus roseus.

FIG. 11.
Inflorescence.

Oxybaphus viscosus.

FIG. 12.
Inflorescence.

[1] LHÉRIT., *Monogr. ined.* (ex VAHL, *Enum.*, ii. 40).—J., in *Ann. Mus.*, ii. 274.—POIR., *Dict.*, Suppl., iv. 255.—ENDL., *Gen.*, n. 2004.—DUCHATRE, in *Ann. Sc. Nat.*, sér. 3, ix. 282, t. 17.—PAYER, *Organog.*, 297, t. 62.—SCHNIZL., *Inconogr.*, 104.—CHOIS., *Prodr.*, 430.—*Calyxhymenia* ORTEG., *Dec.*, v. t. 1, 8, 11.—TURP., in *Dict. Sc. Nat.*, Atl., iv. t. 22.—*Calymenia* NUTT., *Gen.*, i. 25. — *Wittmannia* TURR., in *Cav. Ic.*, 3.—*Palavia* CAV.—*Bruguiera* CAV. (ex CHOIS.).

[2] Sect. *Allionopsis* (CHOIS., *Prodr.*, 432).

[3] According to H. MOHL, the pollen is covered with short spines in *O. viscosus* LHÉR.; and that of *O. nyctagineus* SWEET, is like that of *Mirabilis*.

[4] L., *Spec.*, 147 (*Allionia*).—PURSH, *Fl. Amer. Bor.*, i. 97, (*Allionia*).—SWEET, *H. Brit.*, 567.—R. et PAV., *Fl. Per. et Chil.*, i. 45, t. 75 (*Calyxhymenia*).—PERS., *Enchirid.*, i. 36 (*Calymenia*).—DESF., *Cat. Hort. Par.*, ed. 3, 390.—EDGEW., in *Trans. Linn. Soc.*, xx. p. 1, 87.—C. GAY, *Fl. Chil.*, v. 205.—*Bot. Mag.*, t. 434.—WALP., *Ann.*, 1, 560; v. 721.

[5] L. *Gen.* n. 117 (part.); *Spec.*, 147.—J., *Gen.*, 195; in *Ann., Mus.*, i. 274.—GÆRTN.,

drous. The lower portion of their perianth, which persists around the fruit, presents two lateral ribs, developing into hard laciniate wings, and bending outwards so as almost to meet. They form thus a sort of cell, exterior to that of the indusium, and in which two series of vertical, parallel, glandular tubercles project, developed upon the exterior surface of the anterior wall of the indusium.

Boerhaavia[1] is nearly related to *Oxybaphus*, and is only essentially distinguished therefrom by one single point, the bracts accompanying the flowers varying in number from one to three, are small, often caducous, and do not form a persistent involucre around the fruit which they envelop. Moreover, the flowers, generally small and inconspicuous, present in their different parts those numerous variations of form and proportion which we have observed in *Mirabilis* and in the neighbouring types. The perianth, more or less contracted towards the middle, has a superior petaloid portion infundibuliform or campanulate and caducous, and an inferior portion which persists around the fruit, and is tubular, obconical, or claviform. In *B. gibbosa*[2] it is unsymmetrical and gibbous on one side. This has given rise to a genus *Senkenbergia*.[3] In the others it is regular. The stamens are of the same number as the divisions of the corolla, or more generally less numerous. There are often only three, as in *Oxybaphus*, or two, or even one only. They are united below, and protrude more or less from the corolla. The style is more or less obtuse at its stigmatiferous apex. The induviate fruit is analogous to that of the other *Nyctaginaceæ*. Certain Boerhaavias have their flowers in spikes;[4] others in umbels or verticils; others, again, in racemes or in capitula, simple or compound. All are herbaceous or frutescent at the base, with opposite simple and

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Fruct., iii. 182, t. 214.—Lamk., *Dict.* i. 85, n. 2; *Ill.*, t. 58.—Lhér., *Stirp.*, 63, t. 31.—H. B. K. *Nov. Gen. et Spec.*, ii. 214.—Endl., *Gen.* n. 2005 (part.).—C. Gay, *Fl. Chil.*, v. 208.—Chois., *Prodr.*, 434, n. 5.—*A. malacoides* Benth., *Voy. Sulph., Bot.*, 44.—*Wedelia* Lœfl., *It.*, 180 (nec Jacq.).

[1] L., *Hort. Cliff.*, 17; *Gen.* ed. 1, n. 22.—Adans., *Fam. des Pl*, ii. 265.—J., *Gen.*, 91; in *Ann. Mus.*, ii. 208, t. 127.—Poir., *Dict.*, v. 52; Suppl., iv. 319; *Ill.*, t. 4.—Endl., *Gen.*, n. 2000.—Chois., *Prodr.*, 449, n. 15.—*Dantia* Lipp., mss. (ex Del., *Fl. Ægypt.*, ii. 2 nec Dup.-Th.).—*Antanisophyllum* Vaill., in *Act. Par.* (1792), 190.—*Senkenbergia* Schauer, in *Linnæa*, xix. (1847), 711.—*Tinantia* Mart. et Gal., in *Bull Acad. Brux.*, xi. n. 4, 30.—Chois., *Prodr.*, 457, n. 16.—*Lindenia* Mart. et Zucc., *loc. cit.*, 17 (nec Hook.).

[2] Pav., in *Herb.* (ex A. Gray, *Brief Char...*, 9, n. 6).—*Lindenia gypsophiloides* Mart. et Gal.—*Tinantia gypsophiloides* Mart. et Zucc.—*Senkenbergia annulata* Schauer, *loc. cit.*

[3] A name which A. Gray applied to a section of the genus *Boerhaavia*.

[4] Notably *Senkenbergia* and *B. spicata* Chois., *Prodr.* (456, n. 21).

petiolate leaves. Some twenty-five species[1] of them are enumerated, abounding principally in America, but this genus is found in all the warm regions of the globe.

Abronia[2] has the inflorescence of *Nyctaginia*, with an involucre generally of five leaves, and some differences in the perianth and the fruit. The first is hypocrateriform, with a tube swollen at the base, and a limb spreading more or less obliquely, and separated into lobes, equal or slightly unequal.[3] The androceum is formed of five unequal stamens, included, and adhering to the perianth by their filaments. The style is claviform or tapering towards its stigmatiferous apex. The fruit (fig. 13) is narrow and elongated. The basilar portion of the perianth, which persists round it, dilates as in *Selinocarpus*, into yet more fully developed membranous and veined wings. The embryo has generally only one cotyledon, the interior aborting. The *Abronias* are creeping herbs, natives of the temperate parts of North America. Half a dozen have been described, which are probably only varieties of one and the same species.[4] Their leaves are opposite, long-petiolate and unequal; the pedunculate inflorescence is terminal, although seemingly lateral or axillary.

Abronia cycloptera.

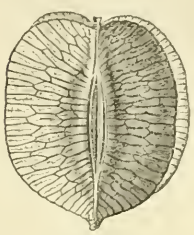

FIG. 13.
Fruit.

Pisonia[5] (figs. 14–17) has regular polygamous flowers. In certain species of them, which are hermaphrodite, is found a perianth forming

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[1] L., *Spec.* 4.—W., *Spec.*, 1, 19; *Phyt.*, i. n. 3.—VAHL, *Enum.*, i. 287.—LOUR., *Fl. Cochinch.*, 20.—H. B. K., *Nov. Gen. et Spec.*, ii. 216.—FORST., *Prodr.*, n. 5.—LAG. et RODR, in *Ann. Cienc. Matr.* (1801), 256.—RICH., in *Act. Soc. Hist. Nat. Par.*, i. 105.—R. BR., *Prodr.*, 422.—C. GAY, *Fl. Chil.*, v. 209.—A. GRAY, *Brief Char...*, 7.—WALP., *Ann.*, i. 559; iii. 298; v. 722.

[2] J., *Gen.*, 448.—GÆRTN., *Fruct.*, iii. 181, t. 214.—LAMK., *Dict.*, viii. 85; *Ill.*, t. 105.—ENDL., *Gen.*, n. 2002.—CHOIS., *Prodr.*, 435, n. 6.—*Tricratus* LHÉR., *Diss.*, c. ic.—*Cycloptera* NUTT., mss.—*Apaloptera* NUTT., mss. (ex A. GRAY).

[3] In this case the exterior ones are the most developed.

[4] HOOK., in *Bot. Mag.*, 2879; *Exot. Fl.*, t. 193, 194; *Fl. Bor.-Amer.*, ii. 125.—ESCH., in *Mém. Pétersb.*, x.; *Descr. Pl. Nov.-Calif.*, 281.—BENTH., *Voy. Sulph., Bot.*, 43.—TORR., in *Frem. first Rep.*, 96; in *Emor. Rep.*, 149; in *Stansb. Expl. Rep.*, 395.—A. GRAY, *Brief Char...*, 5.

[5] PLUM., *Icon.* (ed BURM.), t. 227; *Amer.*, 7, t. 11 (nec ROTTB.).—L., *Gen.*, n. 897.—ADANS., *Fam. des Pl.*, ii. 265.—J., *Gen.*, 91; in *Ann. Mus.*, ii. 275.—GÆRTN., *Fruct.*, i. t. 76—POIR., *Dict.*, v. 346; Suppl., iv. 419.—LAMK., *Ill.*, t. 861.—ENDL., *Gen.*, n. 2012.—CHOIS., *Prodr.*, 440.—*Torrubia* VELLOZ., *Fl. Flum.*, iii. t. 150.—*Bessera* VELLOZ., *op. cit.*, iv. t. 2.—*Pallavia* VELLOZ., *op. cit.*, iv. t. 12.—*Columella* VELLOZ., *op. cit.*, iv. t. 17.—*Tragularia* KŒN. (ex ROXB., *Fl. Ind.*, ii. 345).—*Calpidia* DUP.-TH., *Hist. Pl. Il. Afr. Austr.*, 23, t. 8 (incl.: *Cephalotomandra* KARST. et TRI., *Neea* R. et PAV., *Vieillardia* AD. BR. et GR.).

a cylinder more or less dilated above, where it divides into five valvate lobes. More internally are five stamens, alternating with the divisions of the perianth, exserted, united at the base, with introrse anthers, and a gynæceum resembling that of *Mirabilis*. The fruit, surrounded by the inferior portion of the perianth which persists, is indurated dry and monospermous; and the seed which it contains encloses under its very thin coats a straight embryo with inferior radicle and a not very voluminous albumen. In the male flowers the gynæceum remains inconsiderable or sterile, or occasionally disappears. In the female flowers the stamens are either less numerous or much shorter, and sometimes even wholly absent, included, with sterile anthers, or antherless. But the species, to the number of thirty, included in the genus *Pisonia*, are subject to an indefinite number of variations. The perianth is variable in form, according to the species and sex. In the female flowers it is often cylindrical or clavate. In the male it is frequently shorter ovoid, obovoid or campanulate. The divisions, sometimes not very deep, are either slightly reduplicate, or oftener induplicate in the bud. The androceum is generally the seat of deduplications, which, instead of five stamens, make as many as six, seven, eight, or still more, from twelve to thirty, or even, in *Cephalotomandra*[1] and *Vieillardia*,[2] from thirty to forty. The ovary has always the same organization, but the stigmatiferous extremity

Pisonia discolor.

FIG. 14. Flower ($\frac{4}{1}$).

FIG. 15. Longitudinal section of flower.

Pisonia aculeata.

FIG. 16. Fruit with indusium ($\frac{3}{2}$).

FIG. 17. Transverse section of fruit.

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[1] *C. fragrans* KARST. et TRI., *Fl. gran.*, 23 (ex WALP., *Ann.*, v. 721). The perianth is urceolate-subcampanulate in the male flowers. The stamens are included in these, while in the female flowers they are sterile, and slightly exserted. The greater part of the *Pisonias* moreover, have the fruit induviate.

[2] AD. BR. et GR., in *Bull. Soc. Bot. de Fr.*, viii. 375; in *Ann. Sc. Nat.*, sér. 5, 338. The calyx is subcampanulate.

of the style is very variable in form, sometimes linear, papillose on one side or swollen and club-shaped, or with an irregular head, or separated into papillose branches, as in *Mirabilis*, or even divided into long penicillate rays. The stamens are much exserted in the greater part of the *Pisonias* proper, but in certain species, or in the unisexual flowers, they protrude very little from the perianth,[1] and the genus *Neea*,[2] in everything else similar to the other *Pisonias*, is distinguished only by its stamens, which should be constantly included; this, however, is not quite absolute. The greatest variations may be observed in the fruit and in the seed; first as to the indusium formed round the pericarp by the hardened portion of the perianth. It is globular, ovoid, clavate, or much elongated into a cone. The five prominent ribs which it bears are either naked and little visible, or occupied by glands which cover it over with a viscid secretion. These capitate and stipitate glands are prominent at the surface (figs. 16, 17), and produce a very abundant glutinous juice. The fruit fills all, or a variable portion, of this sac. The seed which it encloses is occupied almost entirely by the embryo, which is as long or longer than itself. In the latter case the cotyledons are more or less corrugated in their length; or their apex is folded back more or less upon the base,[3] as in *Mirabilis* and other analogous genera. Moreover, the two cotyledons envelop each other. The more they enlarge the more concave they become on the posterior side. Their curved edges bend to meet inside; besides which they are involute once or even several times upon themselves. The albumen, becoming proportionally less as the cotyledons encroach upon its mass, occupies the concavity, and is sometimes reduced to a thin tongue, which fills the depression of each half of the posterior cotyledon. Sometimes it is not more than a thin strip or a sort of mucous filament,[4] occasionally even disappearing completely. With all these variations in flower and fruit the *Pisonias* present very constant characters in their organs of vegetation. They are always trees or shrubs, inhabiting the warm regions of all parts of

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[1] It is in the species of the New World that the stamens are described as included.

[2] R. et Pav., *Prodr.*, 52, t. 9; *Fl. Per. et Chil.*, 90.—J., in *Ann. Mus.*, ii. 275.—Endl., *Gen.*, n. 2011. — Chois., *Prodr.*, 447. — *Nebra* Noronh., mss. — *Mitscherlichia* K., in *Berl. Akad. Abhandl.* (1831), 219; (1832), t. 3.

[3] This is seen in certain seeds of *Vieillardia*.

[4] For example, in *Calpidia lanceolata* Dup-Th., and in several others.

the globe.[1] Their bark is spongy; their branches often thorny. Their leaves are alternate or opposite, simple, entire, glabrous and exstipulate. Their flowers are in simple or ramified racemes, generally composed of cymes, sometimes umbelliferous or corymbiferous, terminal, lateral, or inserted upon the wood of the stem or branches. Each flower is accompanied at its base by small bracts, generally two or three, more rarely from four to six, in number.

In *Colignonia*[2] the inferior part of the perianth forms an ovoidal purse, enveloping the ovary with a narrow opening, beyond which it dilates into a bell-shaped limb, with three or five valvate lobes. The androceum is formed of five or six hypogynous stamens, more or less exserted; and the gynæceum, inserted quite at the bottom of the flower, has a glabrous uniovular ovary surmounted by a style, stigmatiferous and capitate papillose, or penicillate at the apex. The fruit is an achene enveloped by the entirely persistent perianth. Its inferior portion is dilated into a kind of sac, with three or four vertical wings. The three or four species[3] of this genus are herbaceous or suffrutescent plants, with very small and very numerous flowers, disposed in simple or ramified racemes of cymes, often umbelliferous, sometimes accompanied by bracts or modified petaloid leaves. They inhabit all western tropical America.

Boldoa[4] has a tubular perianth, analogous to that of certain *Pisonias*, and separated above into four valvate or induplicate teeth. At the bottom is found a gynæceum, surmounted by a long subulate style, and three or four hypogynous exserted stamens. Three or four species have been described, of which the best known is Mexican.[5] The others are from the neighbouring regions, herbaceous

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[1] L., *Spec.*, 1511.—Sw., *Prodr.*, 60; *Fl. Ind. Occ.*, 643, 1960.—H. B. K., *Nov. Gen. et Spec.*, ii. 217.—R. Br., *Prodr. Fl. Nov.-Holl.*, 422.—Endl., *Prodr. Fl. Norfolk*, 43.—Bl., *Bijdr.*, 735.—Guillem., *Zeph. Tait.* 39.—Deless., *Ic. Sel.*, iii. 51, t. 87.—Pœpp. et Endl., *Nov. Gen. et Spec.*, 45, t. 161, 162 (*Neea*).—Casar., *Dec. Pl. Bras.*, viii. 69.—Link, Kl. et Ott., *Pl. Hort. Berol.*, 37, t. 15.—Link, *Enum.*, i. 354.—Benth., *Pl. Hartweg.*, n. 381.—Netto, in *Ann. Sc. Nat.*, sér. 5, v. 80, t. 7, 8.—Walp., *Ann.*, i 561; iii. 298; v. 722.

[2] Endl., *Gen.*, n. 2001.—Chois., *Prodr.*, 439, n. 11.

[3] H. B. K., *Nov. Gen. et Spec.*, ii. 216, t. 128 (*Abronia*). — Spreng., *Syst.*, i. 536 (*Tricratus*).—Benth., *Pl. Hartweg.*, 148, n. 628.

[4] Cav., *Cat. Hort. Matrit.* (1803), t. 7 (nec J.).—Lagasc., *Diagn.*, 10.—Chois., *Prodr.*, 438.—*Salpianthus* H. B., *Pl. Æquin.*, i. (1805), 155.—Endl., *Gen.*, n. 2010.

[5] Spreng., *Syst.*, i. 179.—H. B. K., *Nov. Gen. et Spec.*, ii. 218.—Poir., *Dict.*, Suppl. v. 23; *Ill.*, Suppl., cent. 10, ic.—Mart. et Gal., in *Bull. Acad. Brux.*, x. n. 4, 16.—Benth., *Voy. Sulph., Bot.*, 155.

or suffrutescent, with alternate exstipulate leaves, and numerous flowers disposed in large composite much ramified and terminal racemes.[1]

The flowers of *Bougainvillea*[2] (figs. 18–20) are tubular like those of *Boldoa* and still longer. Their summit is dilated a little into a limb

Bougainvillea spectabilis.

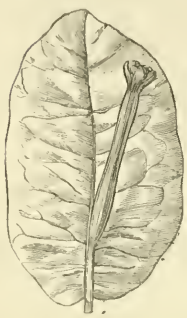

Fig. 19.
Flower and its bract.

Fig. 18.
Inflorescence.

Fig. 20.
Sexual organs.

with five teeth, valvate-induplicate in the bud. The androceum is formed of seven or eight included stamens, with slender filaments monadelphous at the base (fig. 20). Their gynæceum is that of the *Nyctaginaceæ* generally, and their slender style is obtuse or swollen into the shape of a club towards its stigmatiferous apex.[3] But what particularly distinguishes this genus, is that its flowers are surrounded by three petaloid leaves (figs. 18, 19), which have the form and figure of cauline leaves and only differ from them in colour and consistency. In *Bougainvillea* proper, each of these larger bracts has in its axil a flower which is connate with it in a variable portion of its mid-nerve; while in *Tricycla*,[4] generally made a distinct genus, there is only one

[1] *Reichenbachia hirsuta* might doubtless be considered as a section of this genus. *Reichenbachia hirsuta* (Spring., in *Bull. Soc. Philom.* (1823), 54, t. 1.—Endl., *Gen.*, n. 2009.—Chois., *Prodr.*, 439, n. 10). It is a Columbian plant which has the organs of vegetation and the flowers of *Boldoa*, but its diandrous androceum and the style are included.

[2] Chois., *Prodr.*, 437.—*Bougainvillea* Commers., ex J., in *Ann. Mus.*, ii. 275; *Gen.*, 91.—Gærtn., *Fruct.*, iii. 206, t. 216.—Lamk., *Ill.*, t. 249.—Endl., *Gen.*, n. 2008.—Schnizl., *Iconog.*, n. 104.—Duchatre, in *Ann. Sc. Nat.*, sér. 3, ix. 281, t. 16, 17.—Chois., *Prodr.*, 437.—*Josepha* Velloz., *Fl. Flum.*, iv. t. 16.

[3] The thickened short funicle forms a kind of obturator to the ovule.

[4] Cav., *Ic. Rar.*, vi. 79, t. 598; in *Ann.*

flower in the centre of three bracts. *Bougainvillea* consists of shrubs, often sarmentose and thorny,[1] with simple, alternate exstipulate leaves. Half a dozen species[2] have been described, all natives of the warm regions of South America.

B. DE JUSSIEU[3] established an order *Jalapæ* in which he placed with *Pisonia*, *Boerhaavia* and *Mirabilis* all the *Plumbagineæ* and *Amarantheæ* then known. ADANSON[4] reduced the family of the Jalaps to the above three genera. He only retained besides the genus *Plumbago*, of which A. L. DE JUSSIEU[5] made a special order, distinct from that of the *Nyctaginaceæ*, to which he added the genus *Bugainvillea* of COMMERSON. Lindley[6] who first gave to this family the name of *Nyctaginacea*, united therein, like ENDLICHER,[7] eleven of the genera that we know at present, that is to say, besides those already collected by A. L. DE JUSSIEU, *Abronia*, *Oxybaphus*, *Allionia*, *Boldoa* (*Salpianthus*), *Reichenbachia*, *Colignonia*, and *Okenia*.[8] CHOISY who, in 1849, drew up for *Prodromus* the description of the *Nyctaginaceæ*, established the new genus *Nyctaginia*,[9] to which four years later A. GRAY added *Pentacrophys* and *Selinocarpus*.[10] The fourteen genera which we have retained, include about a hundred and twenty species, of which nearly a hundred belong to the warm regions of the New World, extending from Mexico and the Southern United States to Chili and La Plata. There are in Australia but three *Pisonias* and two *Boerhaavias* which are found in all the warm countries on the Globe. The warm regions of Oceania have eight or ten *Pisonias* which are peculiar to them. There is a rather

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Cienc. Nat., v. 63, t. 40.—J., in *Ann. Mus.*, ii. 275.—ENDL., *Gen.*, n. 2007.—CHOIS., *Prodr.*, 436.—*Torreya* SPRENG., *N. Entd.*, ii. 121 (ex ENDL., nec ARN., nec RAFIN.)

[1] The simple or 2, 3-forked spines at the summit represent, as in *Pisonia*, axillary branches or floriferous peduncles, and may bear here and there leaves, coloured bracts, and even flowers.

[2] POIR., *Dict.*, viii. 86; Suppl., v. 358 (*Tricycla*).—W., *Spec.*, ii. 348.—H. B. K., *Nov. Gen. et Spec.*, i. 173, t. 49.—PERS., *Enchirid.*, i. 418.— ? BLANCO, *Fl. Filipp.*, 307.—GARDN., in *Hook. Journ.*, i. 185.—NEUW., *Reis. Bras.*, i. 44, 91, 347; ii. 148.

[3] *Ord. Nat.* (1759), in *A. L. Juss. Gen.*, lxviii.

[4] *Fam. des Pl.*, ii. (1763), 263, fam. xxxvi.—*Nyctagineæ* J., in *Ann. Mus.*, ii. 269.—*Allioniaceæ* HOR., *Prim. Lin. Syst.*, 68.—*Jalapineæ* BATSCH, *Aff.* 324.

[5] *Gen.* (1789), 90, Ord. 3.

[6] *Nat. Syst.*, ed. 2, 213; *Veg. Kingd.* (1846), 506, Ord. 192.

[7] *Gen.*, 310, Ord. 104.

[8] Also *Tricycla*, *Reichenbachia*, *Neea*, ascribed respectively by us to the genera *Bougainvillea*, *Boldoa*, and *Pisonia*, with *Epilithes* Bl., which is a *Serpicula*.

[9] Also *Quamoclidion*, ascribed here to *Mirabilis*.

[10] *Brief Char. of some new Gen. and Spec. of Nyctagin., Princ. Coll. in Texas and N. Mexico* (in *Amer. Journ. of Sc.*, sér. 2, 1853.) The Author also established in this paper, the genus *Acleianthus*, which we join to *Mirabilis* as the title of a section.

smaller number in Asia and Madagascar. The genera *Abronia*, *Okenia*, *Nyctaginia*, *Pentacrophys*, *Selinocarpus* reduced to one, or a small number of species, only inhabit the south-western regions of North America. *Boldoa* and *Colignonia* extend farther south, in the west of South America. *Allionia* occupies a long western zone from Mexico to Chili. *Oxybaphus* is wholly American, except one Indian species, which occupies the sides of the Himalayas. *Mirabilis* is solely American; but *M. Jalapa* has been introduced into all the warm and temperate countries of the globe.[1]

The *Nyctaginaceæ* have been considered as allied at the same time to the *Polygonaceæ*, *Chenopodiaceæ*, *Plumbaginaceæ*, *Phytolaccaceæ*, *Cannabinaceæ*, *Valerianaceæ*, *Piperaceæ*. Despite of external resemblances, they are sharply distinguished from the first three families, for in these the basilar placenta bears the ovule, around which the wall of the ovary is formed by the union of two or several carpellary leaves. The *Cannabinaceæ* have also more than one carpellary leaf to the gynæceum and an axile placenta supporting a single descending ovule in the fertile cell. The *Valerianaceæ* have none of the essential characters of the *Nyctaginaceæ;* for their ovary is really inferior, the insertion of their perianth being what is called epigynous.[2] The ovary of the *Nyctaginaceæ* on the contrary is quite free and superior; but it is constructed absolutely like that of *Piperaceæ* and *Urticaceæ*, that is to say, formed of one single carpellary leaf inserted on the side of the axis which bears one single ascending ovule. However, the ovule of the *Nyctaginaceæ*, always reflexed and not orthotropous, distinguishes them clearly from the *Piperaceæ*, which have neither their petaloid perianth nor their embryo external to the albumen, but possess a double albumen. The gynæceum of *Nyctaginacea* is however also constructed like that of the unicarpellary *Phytolaccaceæ*, that is to say, the *Rivineæ*. These last have also a farinaceous albumen enveloped by the embryo; and they are only distinguished by the organization of their perianth, which has no inferior persistent thickened part, to

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[1] S. Watson, in *Unit. St. Geogr. Expl. of fourt. par.*, Bot., 286, *Hermidium*, n. 8, t. 32. Flowers in capituliform racemes, with 5–7 stamens, analogous to those of *Mirabilis*.

[2] The idea which A. L. de Jussieu had of comparing a calyx to the persistent part of the perianth, and its superior part to a corolla, is quite inadmissible. The affinity appealed to in *Pisonia* and *Viburnum* is only due to superficial appearances. The unicarpellary *Thymelaceæ* are only distinguished from the *Nyctaginaceæ* in the flower by the direction of the ovule.

form a sort of supplementary sacciform pericarp around the fruit, completely closed at the apex. This character is never wanting in the *Nyctaginaceæ*, neither is the aforesaid organization of the gynæceum and the constant direction of the single ovule. The variable characters in this little group serving to distinguish the genera are the mode of inflorescence, the shape and colour of the bracts of the involucre,[1] the form of the perianth, the number of stamens, and the shape of the indusium surrounding the fruit.

The vegetative organs present also several considerable differences in this group. The *Pisonias* are trees or shrubs. The *Bougainvilleas* are thorny or sarmentose shrubs, while, except *Boldoa* and *Colignonia*, which may be frutescent, all the other *Nyctaginaceæ* are annual or perennial herbs. The structure of the stems is frequently similar to that of the *Piperaceæ*, inasmuch as their fibro-vascular system is often double; one interior, and the other exterior. According to Unger,[2] the latter is formed in *Mirabilis* by fibro-vascular bundles, independent of each other and of the central system, and only here and there connected together by lateral anastomoses. The interior, on the contrary, is simple, and consists of a vascular zone whose fascicles pass into the leaves. *Oxybaphus*, also studied in the same work, presents an analogous structure, and has this character in common with *Mirabilis*, that the wood is traversed by irregularly scattered bundles of generative tissue. These observations have been taken up by several authors,[3] and particularly of late years by Regnault,[4] who has proved that there is in *Pisonia fragrans*, inside the suberous and herbaceous epidermic layers, a rudimentary liber-zone, formed of scattered fibres, scantily dotted between which are cells rich in crystals. Then comes a generative zone, surrounding, as elsewhere, the wood and the pith; but both of these contain in their interior

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[1] In *Prodromus* the family has been divided from this character into three tribes: the *Mirabileæ*, which have a calyciform involucre; the *Bougainvilleæ*, in which it is formed of large coloured bracts, and the *Boerhaavieæ* which have no involucre. This artificial division has the inconvenience of separating from each other such types as *Mirabilis*, and others as *Okenia*, *Acleisanthes*, *Pentacrophys*, whose organs of vegetation and efflorescence are absolutely the same, but which have some larger and others smaller bracts, but always inserted in the same way.

[2] Essay on the forms and growth of Dicotyledonous stems.

[3] Link, *Jahresb.* (1840).—Mart., *Gelehrte Anzeig.* (1842), 391.—Lindl., *Introd. to Bot.*, i. 192; *Penn. Cyclop.*, x. (*Boerhaavia*); *Introd.*, 215, fig. (*Pisonia*); *Veg. Kingd.*, 507.—Henfr., *Microsc. Dict.*, art. *Wood* (*Pisonia*, *Boerhaavia*).—Schleid., *Grundz.*, 251; in *Wiegm. Arch.* (1839), 223.—Bisch., *Lehrb.*, ii. 64.—Crueger, in *Bot. Zeit.* (1850), 164 (*Pisonia*).—Oliv., *Stem. in Dicot.*, 26.

[4] In *Ann. Sc. Nat.*, sér. 4, xiv. 144, t. 9.

special formations that give the plants of this family a particular character. In the wood is found beside the medullary rays, formed of a single row of cells, fibro-vascular bundles, representing in transverse section concentric circles of islets. Each bundle comprises externally cells; more internally fibres, and quite inside, vessels. These same bundles are repeated in the pith, composed and arranged in the same way—that is to say, disseminated as in a monocotyledonous stem.[1] The general organization is the same in *Oxybaphus* and *Mirabilis*. But in the former, the bundles scattered through the woody mass in *Pisonia* "tend to, approach, and join each other. The general woody mass in which they are plunged is already a little less homogeneous, and the woody fibres less perfect." And in *Mirabilis* the bundles remain nearly the same; the fibres of the general woody mass have quite the character of young fibres in process of formation from the primitive elongated cell.[2] In all three the pith is partly filled with isolated fibro-vascular bundles. In several genera (*Mirabilis*, *Boerhaavia*, *Oxybaphus*, *Pentacrophys*, *&c.*) the roots rapidly take the conical form of a swollen tap-root, with fleshy concentric layers in which the juices collect; it is often gorged with starch and with certain active principles.

These principles give to the roots of several *Nyctaginaceæ* properties sometimes tolerably powerful,[3] which led the ancients to derive from this family several evacuant drugs, such as Jalap. The production of this was formerly ascribed to the common Marvel of Peru or *Mirabilis Jalapa*[4] L. (figs. 1–10), and to *M. dichotoma* L.[5] and *longiflora* L.[6] It is now known that they only yield a root of spurious Jalap, the section polished blackish or greyish, marked with concentric striæ, "hard, compact, very heavy, with a faint nauseous

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[1] Disposition which introduces into the woody mass the elements of cortical layers. Regn., *loc. cit.*

[2] *Mirabilis*, he says, is destitute of true liber.

[3] Guib, *Drog. Simpl.*, ed. 6, ii. 444.—Endl., *Enchirid.*, 194.—Lindl., *Fl. Med.*, 365; *Veg. Kingd.*, 507.—Rosenth, *Syn. Pl. Diaphor.*, 226, 1111.

[4] See p. 1–4.

[5] *Spec.*, 252 (nec Garer.).—Plenk, *Off.*, t. 139.—Chois., *Prodr.*, 428, n. 2.—*Jalapa officinarum* Martin, *Cent.*, 1, t. 1.—*Nyctago dichotoma* J. (vulg. *Fleur de quatre heures*).

[6] *Spec.*, 252.—Plenk, *Off.* t. 138.—Chois., *Prodr.*, n. 5.—*Jalapa longiflora* Mœnch.—*Akoyati* Hernand., *Mexic.*, 170, fig. 2.—Nees D'Esenbeck (*Pl. Medic.*, Suppl., t. 33), believed that this species supplied the "*racine de Mechoacan gris*" or "*radix Melalistæ*" of the apothecary, which is a powerful drastic. *M. suavolens* (H. B. K., *Nov. Gen. et Spec.*, ii. 213); and *M. odorata* of gardens [in *Linnæa* (1838), 75], regarded in Mexico as good remedies in diarrhœa and rheumatism, are ascribed in *Prodromus* to this species.

odour and a sweetish taste, leaving a little acridity in the mouth. It is said to be pretty strongly purgative. The *Boerhaavias*[1] also often have purgative and emetic roots. In Guiana that of *Boerhaavia diffusa* L.,[2] bears the common name of Ipecacuanha. *B. tuberosa* Lamk.,[3] bears in Peru that of *Yerba de la purgacion*. In Africa and Central America *B. erecta* L.;[4] in India *B. procumbens* Roxb.,[5] serve also as purgatives.

The root of the *B. decumbens* Vahl, is employed as an emetic in Guiana. *B. procumbens* has been also prescribed as a febrifuge, *B. scandens* in hæmorrhoids, and *B. hirsuta* W.,[6] in jaundice. Some plants of this genus have edible roots and buds.[7] It is also said that the roots of the *Pisonias* have evacuant properties: in India *P. aculeata* L.;[8] in America *P. noxia* Nett.[9] This last is considered in Brazil as a powerful irritant, contact with which produces itching and even leprosy, it is asserted.[10] *P. Capparosa* Nett.,[11] of Brazil is used to prepare an infused drink in the province of Minas-Geraes, and, above all, to dye cotton stuffs black.[12] Some of the *Pisonias* of Polynesia and Java have a wood strong enough to serve for building.[13] Several are cultivated in our hothouses for the beauty of their foliage.[14] *Cephalotomandra fragrans*[15] has, like several other *Pisonias*, numerous and fragrant flowers. Like *Mirabilis*, some of them are cultivated in our gardens for their flowers, which blow at night, especially *M. longiflora*, which exhales a sweet and musty odour at evening. The *Abronias* have been introduced into our parterres as ornamental plants, especially *A. umbellata*.[16] The *Bougainvilleæ* ornament our greenhouses, not by their flowers, which are inconspicuous, but by the brilliant colours of the three petaloid bracts protecting the inflorescence.

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[1] H. Bn., in *Dict. Encycl. Sc. Méd.*, x. 18.

[2] *Spec.*, 4.—Chois., *Prodr.*, 452, n. 9.

[3] *Ill.*, i. 10.—Chois., *Prodr.*, 454, n. 16.

[4] *Spec.*, 4 (nec Forst.).—Chois., *Prodr.*, n. 1.

[5] Var., it is said, of *B. diffusa*.

[6] *Phyt.*, i. n. 3.—Chois., *Prodr.*, n. 5.

[7] The young shoots of *B. erecta* are eaten. The tap-roots of *B. mutabilis* are harvested as Salsify in the South Sea Islands. *Olus album* Rumph. (*Herb. Amboin.*, i. 78), whose shoots are eaten with meat at Amboyna, has been named by Spanoghe [in *Linnæa* (1841), 342] *Pisonia alba*.

[8] *Spec.* 1511.—Chois., *Prodr.*, 440, n. 1.—*Tragularia horrida* Kœn.—*Pallavia loranthoides* H. B. K. (*Fingrigo* of Jamaica).

[9] In *Ann. Sc. Nat.*, sér. 5, v. 80, t. 7.

[10] Hence the vulgar names of *Pao lepra*, *Pao Judea*. It is still called *Joáo molle*.

[11] *Loc. cit.*, 82, t. 8 (vulg. *Capparosa do campo*).

[12] The leaves of *P. noxia* serve the same purpose.

[13] Especially *P. sylvestris* Teysm. et Binn. (ex Rosenth., *op. cit.*, 1111).

[14] In Peru the silversmiths use *Chulco*, or *Colignonia parviflora* Endl., to clean silver vases.

[15] See p. 9, note 1.

[16] Lamk. *Ill.*, t. 5.—Chois., *Prodr.*, 435, n. 1.

GENERA.

1. **Mirabilis** L.—Flowers regular hermaphrodite. Calyx petaloid tubular or tubular-infundibuliform. Limb usually patulous, 5-dentate, membranous-dilated between the teeth and induplicate contorted in the bud; tube slightly dilated at base and somewhat constricted above dilatation; upper part caducous. Stamens 5, unequal, even with or slightly longer than tube of perianth, alternating with its teeth; filaments 1-delphous at base, sometimes connate in a short thick fleshy disk-like tube, free above; anthers short 2-celled laterally or subintrorsely rimose at margins. Ovary free above, surrounded at base by a thin disk, 1-celled; style slender recurved at apex; summit globose divided into short simple or slightly ramose capitellate stigmatiferous branches; ovule 1, subbasilar suberect, inserted in internal angle of the ovary, anatropous or subcampylotropous; micropyle anterior, inferior. Fruit (an achene or nearly a caryopsis), clothed with hardened 5-agonal base of the calyx and base of stamens; internal albumen of suberect-seed farinaceous; cotyledons of incurvo-involute peripheral embryo incumbent, unequal (the interior smaller); radicle cylindro-conical inferior.—Herbs; root usually tuberous-conical, stem and branches articulate at nodes; leaves simple opposite exstipulate; flowers crowded in cymes at ends of twigs (sometimes 1-parous); involucre (sometimes calyciform) formed of five large bracts connate at base imbricate or subvalvate, sometimes 2 or 3-flowered (*Acleisanthes*), or 1-flowered (*Eumirabilis*, *Acleisanthes*), or 3–∞-flowered (*Quamoclidion*). Flowers articulate at base beyond involucre (*Tropical and Subtropical Western America*). See p. 1.

2? **Nyctaginia** Choisy.— Flowers nearly of *Mirabilis;* calyx tubular dilated at apex, 5-plicate. Stamens 5, much exserted. Style even with stamens, germen and fruit of *Mirabilis*.—A herb; leaves opposite; flowers terminal, falsely capitate, articulate, surrounded by a polyphyllus imbricate involucre (*Mexico*). See p. 5.

3. **Okenia** SCHIED.—Flowers nearly of *Mirabilis;* subinfundibuliform limb of perianth regular, 5-fid; lobes emarginate. Stamens 15–18. Fruit clothed with hardened suberous base of calyx, 10-costate, closed at apex, finally entering the ground by elongation of peduncle after anthesis. Other characters as in *Mirabilis.*—A prostrate herb; leaves glutinous; flowers solitary terminal, axillary to branches usually short; peduncles much elongated after anthesis; bracts 3, in a short involucre, imbricate under articulate flower (*Mexico*). See p. 5.

4. **Pentacrophys** A. GRAY.—Flowers nearly of *Okenia;* calyx regular. Stamens 2. Germen of *Mirabilis;* style slender, peltate stigmatiferous at apex. Fruit clothed with cylindrical base of calyx, 5-costate, truncate at apex; ribs thick suberous longitudinal, swelling to large glands at apex. Other characters as in *Mirabilis.*—A low herb, lignescent at root, many stemmed, and viscous-pubescent scabrid; leaves opposite petiolate; flowers terminal or lateral to leaves; bracts below articulate flower, 3 subulate (*N. Mexico*). See p. 5.

5. **Selinocarpus** A. GRAY.—Flowers nearly of *Okenia;* calyx subcyathiform or infundibuliform-tubular 5-agonal. Stamens 2–5 exserted. Germen, fruit and seed of *Mirabilis;* style of *Okenia.* Fruit clothed by accrescent base of calyx produced into 3–5 membranous-scarious vertical wings.—Low herbs, sometimes suffrutescent, many-stemmed from tuberous or lignescent root; flowers terminal or lateral to leaves, 2-nate or many glomerulate; bracts below flower 1–3 minute (*N. Mexico*). See p. 5.

6. **Oxybaphus** VAHL.—Calyx very shortly tubular at base; limb 4–5-merous, regular or oblique campanulate folded, deciduous. Stamens 3, 4, connate at base. Germen of *Mirabilis;* style granular-capitate at apex. Fruit ovate costate, seed, embryo, albumen of *Mirabilis.*—Herbs; leaves opposite; flowers in cymes often 1-parous and lateral; involucre gamophyllous, 5-fid, 1- or 3-flowered (*Allionopsis*), sometimes 4, 5-flowered, often marcescent after anthesis (*Tropical and Subtropical America, Mountainous India*). See p. 6.

7. **Allionia** L.—Flowers nearly of *Oxybaphus;* regular 4-merous.

Stamens 4 included. Gynæceum of *Oxybaphus*. Fruit clothed by hardened base of calyx; wings 2, marginally dentate, spinulose afterwards reflexed, so as to form an exterior cell, containing 2 series of vertical capitate-glandular tubercles. Seed of *Oxybaphus;* embryo folded.—A herb; leaves opposite; flowers 3-nate, opposite lobes of gamophyllous 3-fid involucre (*Warm and Western America*). See p. 6.

8. **Boerhaavia** L.—Calyx 2-partite to middle; upper part infundibuliform or campanulate petaloid, apex 5-lobed, deciduous; lower part cylindrical or obconical, persisting round the fruit, indurated (virescent or nigrescent), afterwards sometimes slightly gibbous, (*Senkenbergia*). Stamens 1–5 connate at the base, often exserted. Germen nearly of *Mirabilis;* style erect, sometimes longitudinally sulcate at back; apex thickened, stigmatiferous. Fruit and seed nearly of *Oxybaphus;* embryo usually conduplicate.—Herbs annual or perennial, or frutescent at base; leaves opposite; flowers (small, insignificant) in simple or ramified spikes, or generally in cymes; cymes regular or 1-lateral, rarely solitary or with few flowers, or reduced to 1; bracts small, not coloured (*All warm regions of the Globe*). See p. 7.

9. **Abronia** J.—Calyx hypocrateriform; tube narrow, more or less inflated at base; limb open, sometimes oblique, 5-lobed deciduous. Stamens 5, included, adnate to base of perianth. Germen and ovule of *Mirabilis;* style subclavate to stigmatiferous apex. Fruit clothed with base of 5-agonal costate calyx, which is dilated into from 3–5 wings more or less membranous-venose. Seed of *Mirabilis;* second (interior) cotyledon of subcontorted or conduplicate embryo, abortive. —Creeping herbs; leaves opposite, unequal long-petiolate; flowers, glomerules, falsely capitate with involucre; usually 5-phyllus, inserted at the summit of the usually elongated peduncle (*North Temperate America*). See p. 8.

10. **Pisonia** Plum.—Flowers dicœcious or polygamous; calyx often coloured, much varied in form, subovoid, campanulate, clavate, or tubular (in the female flowers often longer and more tubular); teeth 4–6, oftener 5, usually short valvate, or induplicate valvate, more rarely subreduplicate. Stamens 5–10, or more rarely 10–30–40; filaments free at the base or slightly connate, usually unequal, either

exserted (*Eupisonia*), more rarely subexserted, or included or subincluded (*Neea*), in female flowers sterile, generally included; anther cells subovate, separate. Germen and ovule nearly of *Mirabilis;* style generally lateral (posterior), included or exserted; apex laterally stigmatiferous, thickened, subclavate, subcapitate, or more or less penicillate-fimbriate or ramose. Fruit clothed with the hardened cylindrical, obovoidal subclavate ovoidal or conoidal base of perianth, slightly glabrous, or with 5 viscous or glandular-serrate or capitate-glandular ribs. Seed suberect; embryo erect; radicle inferior; cotyledons straight or incurved conduplicate at apex, straight at margin, or incurved, or involute, generally unequal (interior smaller); albumen in the concavity of cotyledons very small or a little mucilaginous, sometimes more or less fleshy.—Trees or shrubs glabrous or pilose; bark often spongy; branches often (with axillary shoots or abortive peduncles) aculeate; leaves alternate or opposite, often entire; flowers cymose; cymes solitary, terminal, sometimes capituliform, generally in simple or ramified panicled racemes; bracts small, 1–3 or more rarely 4–6 (*All warm regions of the Globe*). See p. 8.

11. **Colignonia** Endl.—Calyx subcampanulate, 2–5-fid, the base persisting round the ovary, dilate-ovoid. Stamens 3–6 included. Ovary and ovule nearly of *Pisonia;* style slender; apex stigmatiferous, capitate, or penicillate-multifid. Fruit clothed with the base of the calyx, growing into 3–5-agonal wings, crowned by the persistent limb of the perianth.—Herbs or small shrubs; leaves opposite, flowers minute in close false umbels, solitary or frequently ramified-compound; bracts small, sometimes coloured (*South Warm and Western America*). See p. 11.

12. **Boldoa** Cav.—Calyx tubular; apex 4-dentate. Stamens 2–4 hypogynous, exserted or more rarely (*Reichenbachia*) included. Germen and ovule nearly of *Pisonia;* style slender, erect; apex pointed or capitate stigmatiferous, exserted or included.—Herbs, undershrubs, or small shrubs; leaves alternate; flowers in small cymes; cymes arranged in simple or ramified racemes, or sometimes in corymbs; bracts very small (*Western Warm America*). See p. 11.

13. **Bougainvillea** Commers.—Calyx long, tubular; limb short,

5-dentate, induplicate-valvate. Stamens 5–8, or rarely 9, 10, included. Germen and ovule nearly of *Pisonia;* style posteriorly excentric, laterally stigmatiferous, thickened, subclavate, or attenuated at apex. Fruit clothed with the cylindrical tube of the perianth.—Small trees or shrubs, often climbing, and armed with simple or at apex 2–3-fid spines (shoots or abortive axillary peduncles); flowers solitary (*Tricycla*) or 3-nate (*Eubougainvillea*), surrounded by involucre of three bracts, leaves equal, bright coloured (*Warm and Southern America*). See p. 12.

XXV. PHYTOLACCACEÆ.

1. PHYTOLACCA SERIES.

Phytolacca[1] has regular flowers often hermaphrodite, with a perianth sometimes petaloid formed of five leaves quincuncially

Phytolacca decandra.

FIG. 21.
Floriferous branch ($\frac{2}{3}$).

FIG. 28.
Root ($\frac{1}{10}$).

imbricated, inserted upon a convex receptacle. More internally,

[1] T., *Inst.* 299, t. 154.—L. *Gen.*, n. 588.—ADANS., *Fam. des Pl.*, ii. 262.—J., *Gen.*, 84.—POIR., *Dict.*, v. 306; Suppl., iv. 406.—LAMK., *Ill.*, t. 393.—GÆRTN., *Fruct.*, i. 377, t. 77.—

in the species easiest to study here, *P. decandra*[1] (figs. 21–28), there are, as indicated by the specific name, ten stamens, each formed of a filament free or united for a very short distance with the base of the neighbouring filaments, and a nearly oboval, bilocular, introse anther, dehiscing by two longitudinal clefts.[2]

Phytolacca decandra.

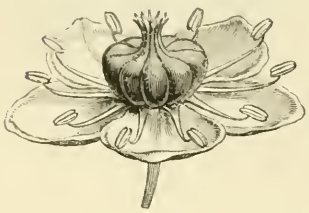

FIG. 22.
Flower ($\frac{6}{1}$).

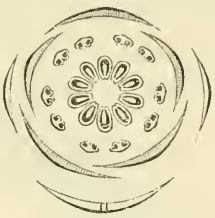

FIG. 23.
Diagram.

FIG. 24.
Longitudinal section of flower.

FIG. 26.
Seed ($\frac{4}{1}$).

FIG. 25.
Fruit ($\frac{3}{4}$).

FIG. 27.
Longitudinal section of seed.

These stamens are hypogynous, placed upon a single verticil and corresponding by pairs to the intervals of the sepals (fig. 23). The gynæceum is free and superior; in most of the flowers it is composed of ten carpels, five being superposed to the sepals and five alternate. They are united below, and free above to a distance which varies not only with the age of the flower,[3] but even in different

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NEES, *Fl. Germ.*, fasc. viii. t. 2.—ENDL., *Gen.*, n. 5262.—PAYER, *Organog.*, 303, t. 63.—MOQ., in *DC., Prodr.*, xiii. sect. ii. 31, n. 13.—LEM. et DCNE., *Tr. Gén.*, 455.—*Phytolacca* RAFIN., *Fl. Tell.*, n. 627.—*Sarcoca* RAFIN., *loc. cit.*, n. 628.—*Pircunia* MOQ., *Prodr.*, 29 (nec BERTER.).

[1] L., *Spec.*, 631.—TURP., in *Dict. Sc. Nat.*, atl., t. 20.—RÉV., in *Bot. Méd. du* xix^e^ *siècle*, iii. t. 5.—*Bot. Mag.*, t. 931.—*P. vulgaris*.... DILL., *Elth.*, ii. 318, t. 239, f. 309. (*Grape of America, Canada, of the dyers, sweet Spinnage, Méchoacan of Canada, Herbe à la laque, Great Nightshade of India.*)

[2] According to H. MOHL (in *Ann. Sc. Nat.*, sér. 2, iii. 331), the pollen is ovoid or spherical; three grooves; in water globular, with three narrow bands, *P. abyssinia*, *P. scandens*.

[3] At first in almost their whole height, because they are raised by a common basilar portion. Even in the green fruit, where they are united to a great extent, ten deep grooves may be distinguished which separate them one from another, but these grooves disappear in almost the whole length of the ripe fruit, which is smooth on the surface (fig. 25).

flowers on one and the same stem. Their number is rarely less, and sometimes greater in the plants cultivated in gardens. Each is composed of a unilocular ovary surmounted by an independent style, whose extremity, a little attenuated and bent outwards, is charged with stigmatic papillæ.

In the internal angle of each ovary, and close to its base is found a placenta on which is inserted a single campylotropal ascending ovule, with the micropyle directed downwards and outwards.[1] In the fruit, accompanied at the base by the persistent perianth,[2] and which is entirely fleshy and pulpy, the carpels are little distinct except quite close to the apex. Each encloses a single seed containing under its thick coats a farinaceous albumen surrounded by an almost annular fornicate embryo, with flattened cotyledons adhering one to the other by their internal surface, and a conical radicle directed downwards (fig. 27). *P. decandra* is a perennial herb, found in most of the temperate regions of the globe. The root is a thick taproot (fig. 28). The stems are hollow, with alternate simple, petiolate, exstipulate leaves. Its flowers are arranged in leaf-opposed racemes, each placed in the axil of a bract, and accompanied by two sterile lateral bractlets, elevated to a variable height upon the pedicel.

In other species of the genus *Phytolacca*, the number of stamens is sometimes less than ten, because two, three or even five sepals have only one stamen before them instead of a pair. In others this number rises as high as fifteen, twenty, or twenty-five because inside these five groups of alternisepalous stamens there are five others alternate with them, each formed of one, two or three pieces.[3] In certain species composing the genus *Pircunia*, the carpels remain free in their whole extent, or nearly so, even in the fruit, and their consistence is less fleshy. Their number may rise to twelve or fifteen, because some of them are reduplicate like the stamens. Some species are frutescent, arborescent, sometimes climbing; and one of them, which is a moderately large tree, has dicœcious flowers.[4]

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[1] It has two coats.

[2] Green at first, it takes gradually a reddish tint.

[3] Payer, *Organog.*, 304.

[4] *P. dioica* L., *Spec.*, 632, n. 4.—*Pircunia dioica* Moq., *Prodr.*, 30, n. 5.

Thus defined,[1] the genus *Phytolacca* includes a dozen species[2] inhabiting the warm and temperate regions of Africa, Asia, Oceania, and America.

The flowers of *Ercilla*[3] are very analogous to those of certain *Phytolaccæ*.[4] Their receptacle is in the form of a little cup with edges scarcely turned up, while the centre rises into a cone bearing the gynæceum. The perianth inserted upon the margin is formed of five unequal coloured sepals, arranged in the bud in quincuncial prefloration. The stamens are inserted in the same way, each formed of a free filament, and bilocular introse anther, dehiscing by two longitudinal clefts. Their number varies in *E. volubilis* from eight to eleven. Five of them alternating with the sepals constitute an exterior verticil.[5] A second verticil is formed of three stamens nearer the interior, superposed to sepals 3, 4, and 5, but opposite to sepals 1, 2, and when there are from four to six pieces in the inner verticil it is because two or three of its stamens are replaced by a pair of these organs. The gynæceum is composed of five carpels superposed to the sepals; each of them formed of a unilocular ovary inserted on the raised part of the receptacle and attenuated above into a style, the inner angle being traversed by a longitudinal groove descending quite to the base of the ovary, the thick reflexed lips of which are covered all over with stigmatic papillæ. The number of carpels is not always five.[6] In the internal angle of each ovary, quite close to the base is a placenta supporting a single ascending anatropous ovule with the micropyle

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[1] PHYTOLACCA:

Sect. 4.
1. *Euphytolacca* (MOQ.). Fruit single, globose-depressed, costate. Herbs with erect racemes.
2. *Omalopsis* (MOQ.). Fruit single, not costate. Racemes pendent at the summit.
3. *Pircuniastrum* (MOQ.). Fruit with free carpels. Racemes erect or pendent.
4. *Pseudolacca* (MOQ.). Flowers dioecious, carpels free except at the base. Racemes pendent.

[2] KÆMPF., *Amœn.*, 828 (*Jamma Gobo*).—MŒNCH, *Meth.*, Suppl., 107.—H. B. K., *Nov. Gen. et Spec.*, ii. 183.—SPRENG., *Syst.*, ii. 467, n. 5 (*Glinus*).—FORSK., *Fl. Æg.-Arab.*, 58, n. 95 (*Pharnaceum*).—SWEET, *Hort. Brit.*, ed. 3, 571.—WALL., *Cat.*, n. 6959 (*Rivina*).—HOFFM., in *Comm. Gœtt.*, xii. 27, t. 3.—LHÉR., *Stirp.*, i. 143, t. 69; 145, t. 70.—RÉM., in *C. Gay Fl. Chil.*, v. 257 (*Pircunia*), 259.

[3] A. JUSS., in *Ann. Sc. Nat.*, sér. 1, xxv. 11, t. 3.—DON, in *Edinb. New Phil. Journ.*, xiii. 237.—MOQ., *Prodr.*, 34.—*Ercilia* ENDL., *Gen.*, n. 5263.—*Bridgesia* HOOK. et ARN., in *Bot. Misc.*, iii. 168, t. 102.—*Galvezia* BERTER., mss. (ex MOQ.).

[4] Of which, perhaps with reason, a section only might be made.

[5] Exceptionally these stamens may be the only ones which subsist.

[6] One or several carpels may in fact be replaced by a pair; so much tendency is there to deduplication in these plants.

looking downwards and outwards, the hilum being early swollen into an annular cushion. The fruit accompanied at its base by the calyx which remains membranous, is formed of several carpels, at first slightly fleshy, afterwards dry, each enclosing a seed quite analogous to that of *Phytolacca*. The *Ercillæ* are herbaceous, perennial climbing plants. Their leaves are alternate, simple, exstipulate.[1]

The flowers are arranged in axillary spikes; and each placed in the axil of a bract is accompanied by two sterile lateral bractlets. This genus includes probably but one species, the Chilian and Peruvian *E. volubilis*,[2] often cultivated in our green houses.

Anisomeria[3] represents the irregular form of *Phytolacca*[4] and *Ercilla*; for the quinary calyx, and stamens from ten to thirty, are more developed on the posterior than the anterior side of the flower; and the carpels, from three to six, become achenes more or less vesiculate, the seed being nearly that of *Phytolacca*. It consists of frutescent or herbaceous plants natives of Chili, with taproots, erect stems, entire leaves, and flowers arranged in racemes or terminal spikes. Two species have been described.[5]

The *Giseckias*[6] (figs. 29, 30) may be taken in this series as a type of a distinct subseries. They have small hermaphrodite or polygamous, pentamerous flowers. Their five sepals, membranous at the margin, are quincuncially imbricated in the bud. They cover an androceum of five stamens alternate to the sepals; or of ten stamens, of which five are superposed; or even of fifteen stamens, some among them being replaced by a pair. All have a free fila-

Giseckia pharnaceoides.

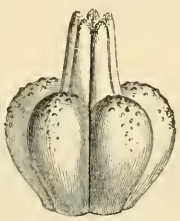

FIG. 29.
Gynæceum ($\frac{8}{1}$).

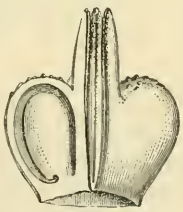

FIG. 30.
Longitudinal section of gynæceum.

[1] In their axil is seen a bud, above which is developed an adventitious root, covered with hair when young.

[2] A. JUSS., *loc. cit.*—RÉM., in *C. Gay Fl. Chil.*, v. 261.—*E. spicata* MOQ.—*Suriana volubilis* DOMB.—*Galvezia spicata* BERTER.

[3] DON, in *Edinb. New Phil. Journ.*, xiii. (1832), 238.—MOQ., *Prodr.*, 25.

[4] From which they can hardly be separated, except as a subgenus.

[5] PŒPP. et ENDL, *Nov. Gen. et Spec.*, 26, t. 43–45.—RÉM., in *C. Gay Fl. Chil.*, v. 254.

[6] L., *Mantiss.*, n. 1340.—J. *Gen.*, 315.—MOQ., *Prodr.*, 26.—B. H., *Gen.*, 859, n. 20.—*Giseckia* ENDL., *Gen.*, n. 5261.—*Kœlreutera* MURR., in *Nov. Comm. Gœtt.*, iii. t. 2, fig. 1 (nec LAXM.),—*Miltus* LOUR., *Fl. Cochinch.*, ed. 1 (1790), 302.—DC., *Prodr.*, iii. 454 (*Ficoideæ*).

ment united at the base, for a very short distance with the neighbouring filaments, and a biloeular introrse anther with an almost lateral dehiscence. The gynæceum is composed of five free carpels superposed to the sepals, each formed of a uniloeular ovary containing an almost basilar ascending ovule with an inferior and exterior micropyle, and surmounted in the internal angle by a short style stigmatiferous above and within.

The fruit is formed of five membranous achenes, the reniform seed containing under its coats[1] an annular embryo surrounding a farina-

Limeum africanum.

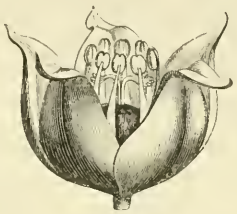

FIG. 32.
Flower ($\frac{6}{1}$).

FIG. 33.
Longitudinal section of flower.

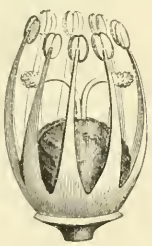

FIG. 34.
Flower without perianth.

FIG. 31.
Floriferous branch.

FIG. 35.
Gynæceum ($\frac{1,2}{1}$).

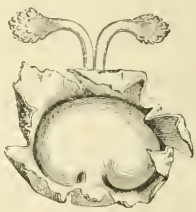

FIG. 36.
Gynæceum, open.

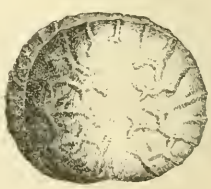

FIG. 37.
Fruit complete ($\frac{6}{1}$).

ceous albumen. The *Giseckias* are small herbs, often annuals, with branches generally spreading bearing opposite leaves, or

[1] The testa is black, finely granulated or almost smooth.

arranged in exstipulate false verticils.[1] The small flowers are united in the axils of the leaves in cymes or glomerules, sometimes capituliform. Four or five species[2] are known inhabiting Asia or tropical Africa.

Beside *Giseckia* is placed *Limeum*[3] (figs. 31–40). It has hermaphrodite or polygamous flowers. The receptacle is slightly convex, supporting a calyx[4] of five sepals, membranous upon the margin, arranged in quincuncial prefloration in the bud. With them alternate five, four or three petals? of variable size and shape, which however sometimes quite disappear (figs. 32, 33). The stamens vary in number from five to seven, eight or ten. In the first case they are superposed to the sepals; otherwise two or more of them are replaced by a pair.[5]

Limeum africanum.

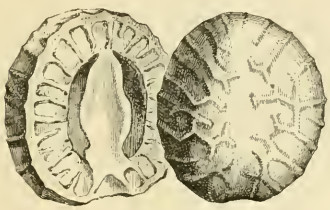

FIG. 38.
Fruit with the two shells separated.

FIG. 39.
Seed ($\frac{8}{1}$).

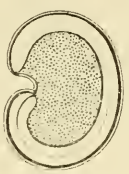

FIG. 40.
Longitudinal section of seed.

Each is composed of a filament united to the neighbouring filaments for a very short distance, and a bilocular, introrse anther, dehiscing by two longitudinal clefts. The gynæceum is formed of two carpels, one flattened ovary being applied to the neighbouring unilocular and uniovular ovary. The ovule is almost erect, supported by a short funicle; campylotropal, with the micropyle turned downwards and on one side. Two styles expanded and stigmatiferous

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[1] They are like the calyx, riddled with small whitish cystolites.

[2] ROXB., *Pl. Corom.*, t. 183.—WIGHT, *Icon.*, t. 1167, 1168.—FORSK., *Fl. Æg.-Arab.*, 58, n. 95 (*Pharnaceum*).—HOCHST., in *Kotsch. It. Nub.*, n. 2.—RŒUSCH, *Nomencl.*, 141 (*Miltus*).

[3] L., *Gen.*, n. 463.—J., *Gen.*, 314.—LAMK., *Dict.*, iii. 514; Suppl., iii. 435; *Ill.*, t. 275.—GÆRTN., *Fruct.*, i. 367, t. 76.—ENDL., *Gen.*, n. 5258.—MOQ., *Prodr.*, 20.—B. H., *Gen.*, 859, n. 22.—*Linscotia* ADANS., *Fam. des Pl.*, ii. 269.—*Dicarpæa* PRESL, *Symb.*, i. 37, t. 26.—*Guadinia* J. GAY, in *Bull. Féruss.*, xviii. 412.—*Acanthocarpæa* KL., in *Pet. Mossamb., Bot.*, 137, t. 24.

[4] Here and there are tetramerous flowers.

[5] Thus, when there are seven stamens, it is because the two stamens superposed to the outer sepals are doubled.

at their apices, surmount the ovaries. The fruit, accompanied at its base by the persistent calyx, is composed of two orbicular compressed achenes, smooth or rugose, touching each other within by a flat surface, but separating easily. Their thick solid pericarp hollowed by vacuoles, thinner within where there are apertures (figs. 37, 38), encloses a vertical seed (figs. 39, 40); its membranous coats covering an annular embryo with inferior radicle, enveloping a farinaceous albumen. *Limeum* consists of annual or perennial herbs of Asia and tropical Africa. The leaves are alternate, narrow, simple, entire or ciliate, and exstipulate. The flowers are arranged in axillary or subterminal cymes sometimes united in racemes of terminal cymes, when bracts replace the ordinary leaves at the apex of the branches. Ten species have been described.[1] With the same vegetative organs and floral organization, *Semonvillea*,[2] of which one Cape species is known, and another of Western Tropical Africa, has been taken for the type of a particular genus, because the edges of the achenes expand into an orbicular wing, transforming them into samaras. We only make it a section of the genus *Limeum*.

II. BARBEUIA SERIES.

Barbeuia[3] (figs. 41–43) has regular, hermaphrodite, apetalous flowers. Upon the slightly convex receptacle are inserted five sepals, a little unequal as to size and thickness, and arranged in quincuncial prefloration in the bud. More internally, upon the slightly projecting ring of the receptacle are inserted an indefinite number of stamens, each formed of a free filament and a bilocular,[4] introrse, sagittate anther, dehiscing by two longitudinal clefts. The gynæceum is free and superior, formed of a bilocular[5] ovary, sur-

[1] Fenzl, in *Ann. Wien. Mus.*, i. 341.—Harv. et Sond., *Fl. Cap.*, i. 152.

[2] J. Gay, in *Bull. Féruss.*, xviii. 412.—Endl., *Gen.*, n. 5259.—Fenzl, in *Dec. Mus. Vindob.*, n. 48.—Moq., *Prodr.*, xiii. p. 2, 19.—Hook., *Icon.*, t. 587.—B. H., *Gen.*, 859, n. 21.

[3] Dup.-Th., *Gen. Nov. Madag.*, 6.—Endl., *Gen.*, n. 6843.—H. Bn., in *Adansonia*, iii. 312 t. 6.

[4] Its cells are independent at their two extremities.

[5] The separating partition of the cells descending from the apex of the ovary to its base, does not here adhere to the ovary wall.

mounted by a style almost immediately separated into two thick elongated branches, furnished within and upon the reflexed edges

Barbeuia madagascariensis.

FIG. 41.
Flower ($\frac{3}{1}$).

FIG. 43.
Gynæceum, open ($\frac{5}{1}$).

with stigmatic papillæ. In each of the ovary cells is a placenta, basilar or sub-basilar, supporting a campylotropal ovule. The micropyle is inferior and lateral, as in *Limeum*, turned in such a way that that of one cell being placed on the right side, that of the other on the contrary is turned to the left. The fruit is, according to DUPETIT-THOUARS, capsular and bilocular, each cell containing an arillate seed. The only species known of this genus[1] is a slender climbing shrub of Madagascar, with alternate entire petiolate leaves,[2] articulated at the base. The flowers are arranged in short axillary racemes with compressed axis, each of them having a rather long pedicel which swells towards its upper part. It is thus seen that with the vegetative organs of *Seguieria*, &c., *Barbeuia* has the gynæceum of *Limeum*, but with two ovary cells always united and close together.

Barbeuia madagascariensis.

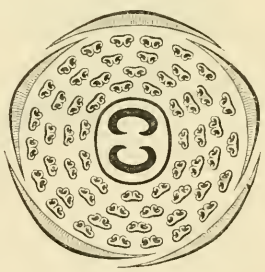

FIG. 42.
Diagram.

[1] *B. madagascariensis* STEUD., *Nom.*, 101.
[2] They become black in desiccation, and have a disagreeable odour.

III. AGDESTIS SERIES.

The flowers of *Agdestis*[1] (fig. 44) are hermaphrodite, regular, tetramerous, with a concave obconical receptacle in which the ovary is contained, while four sepals are epigynically inserted upon the margin; they are imbricate-decussate in the bud, reflexed after anthesis. Within the calyx are found an indefinite number of stamens, each formed of a slender filament, and a slightly introrse anther, with two elongated cells attenuated and free towards their two extremities. The inferior ovary has four cells superposed to the sepals, and in each is seen towards the base an ascending ovule with micropyle looking downwards and outwards. The ovary is surmounted by a style conical at the base, then cylindrical, erect, separated above into four curved branches, stigmatiferous within. The fruit is hitherto unknown. The only species of this genus which represents, as is seen, a *Phytolacca* with tetramerous flowers, and an inferior ovary and carpels all united, is the *A. clematidea* Moq. and Sess., a climbing shrub of Mexico which has the appearance of certain other sarmentose *Phytolaccæ* such as *Seguieria*, and above all *Ledenbergia*. This plant, consequently, has not in its organs of vegetation any of the ordinary characteristics of the climbing *Dilleniaceæ* with which it was erroneously connected at a time when the organization of its flowers was very imperfectly known. Its glabrous, slender branches have alternate simple petiolate leaves and flowers collected in the axils of the leaves or at the summit of the branches, in more or less ramified racemose cymes. Each slender pedicel, like several axes of the inflorescence, bears under the flower two lateral bractlets.

Agdestis clematidea.

Fig. 44.
Longitudinal section of flower ($\frac{4}{1}$).

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[1] Moq. et Sess., *Fl. Mex. Med.* (ex DC., *Syst.*, i. 543; *Prodr.*, i. 103).—Endl., *Gen.*, n. 1681.—B. H., *Gen.*, 33.

IV. RIVINA SERIES.

Rivina[1] (figs. 45–50) has regular hermaphrodite flowers. On the convex receptacle is inserted a calyx with four sepals more or less petaloid, of which one is anterior, one posterior, and two lateral; they are imbricated in the bud in a variable manner.[2] More internally the androceum is found. In certain species, such as

Rivina humilis.

Fig. 45.
Floriferous and fructiferous branch.

Fig. 46.
Flower ($\frac{4}{1}$).

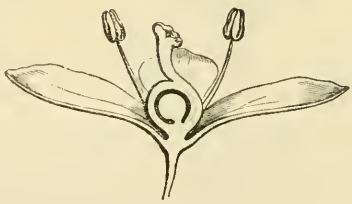

Fig. 48.
Longitudinal section of flower ($\frac{6}{1}$).

R. humilis, lævis, orientalis, &c.,[3] it is formed only of four stamens alternating with the sepals. In other species eight may be counted, as in *R. octandra,* and even from ten to twelve, as in

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[1] Plum., *Gen.*, 47, t. 39, 3.—Gærtn., *Fruct.* i. 375, t. 77, fig. 5.—Lamk., *Dict.*, vi. 213; *Ill.*, t. 81.—Endl., *Gen.*, n. 5257.—Payer, *Organog.*, 301, t. 62.—Moq., *Prodr.*, xiii. sect. ii. 10.—*Solanoides* T., in *Act. Par.* (1706), 87, ic. 7.—*Rivinia* L., *Gen.*, n. 162.—J., *Gen.*, 84.—*Piercea* Mill., *Dict.*, vi. 310.—Rafin., *Fl. Tell.*, n. 631.—*Villamilla* R. et Pav., mss. (ex Moq.)

[2] Sometimes the two lateral are hidden, and sometimes the anterior covers the lateral, which envelops the posterior.

[3] Sect. *Piercea* (Moq., *Prodr.*, 11).

R. peruviana.[1] Each is composed of a filament free or scarcely united at the base to the neighbouring filaments, and of a two-celled introrse anther[2] dehiscing by two longitudinal clefts. The gynæceum is superior;[3] it is formed of a one-celled ovary, surmounted by a style eccentrically inserted towards the posterior edge of the ovary and traversed in its whole length by a vertical groove, prolonged into the interior of the stigmatiferous head of the style. In the ovary cell there is a subbasilar placenta, supporting a single ascending campylotropal ovule with the micropyle looking downwards and from the anterior side of the flower.[4] To the ovary succeeds a fruit which is accompanied at its base by the green perianth and the reflexed staminal filaments surmounted by a vestige of the withered style. The pericarp is thin and quite fleshy. It contains a sessile seed, enclosing under its coats,[5] furnished with a very small aril,[6] an

Rivina humilis.

FIG. 49.
Seed ($\frac{6}{1}$).

FIG. 47.
Diagram.

FIG. 50.
Longitudinal section of seed.

annular embryo, with unequal cotyledons enveloping each other,[7] and surrounding a central farinaceous[8] albumen. The *Rivinas* are suffrutescent plants, natives of warm and temperate America;[9] seven or eight species[10] are distinguished. Their stems are erect or rarely

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[1] These two species, which are distinguished moreover by a short style, a penicillate stigma, and climbing stems, form the section *Villamilla* (MOQ., *Prodr.*, 10).

[2] The pollen is "transparent, spherical, divided by linear bands, like a pentagonal dodecahedron, in the *R. brasiliensis, humilis*" (H. MOHL., in *Ann. Sc. Nat.*, sér. 2, iii. 330).

[3] There is only one anterior carpellary leaf.

[4] It has two coats.

[5] Those of *R. humilis* are: an epidermis with long pointed papillæ, or cellulose hairs, which exist already upon the primine, simple or separated towards their summit into two or three branches; a testaceous, smooth, black brittle envelope; a thin, whitish membrane applied directly upon the embryo.

[6] This is a slight whitish or fleshy thickening, surrounding the umbilical region (which forms a little depression at its centre), and becoming slightly reniform in *R. humilis*, its concave edge looking at the micropyle.

[7] Folded twice upon themselves in most of the species.

[8] Granular in *R. humilis*.

[9] "An in India or. indig.?" (MOQ.)

[10] L., *Spec.*, 177; *Mantiss.*, 41.—MILL., *Dict.*, v. 611 (*Piercea*).—NOCC., in *Usler. Ann.*, vi. 63.—SCHRAD., *Gen. Ill.*, 17, t. 5.—H. B. K., *Nov. Gen. et Spec.*, ii. 183.—*Bot. Mag.*, t. 1781.

climbing, with alternate, petiolate, simple, exstipulate leaves.[1] The flowers are united in terminal racemes, which, in consequence of the "usurpation" of the axillary branches, appear lateral or leaf-opposed. Each occupies the axil of a bract, and is accompanied by two lateral bractlets raised sometimes as far as the calyx.

Beside *Rivina* are placed *Mohlana* and *Ledenbergia*, which have the same gynæceum and an analogous fruit with a more or less coriaceous pericarp. But the *Mohlanas*,[2] plants of both Worlds, of which four species[3] are known, have four stamens and an irregular perianth, the anterior leaf being nearly free, while the three others are united into a sort of posterior lip.[4] *Ledenbergia*,[5] of which a suffrutescent climbing American species[6] is the only representative, has numerous stamens and a regular tetramerous calyx; but its lobes grow and spread themselves round the fruit in a large, rotate, tetraphyllous, dry and reticulate indusium.

Petiveria[7] (figs. 51, 52) has also tetramerous apetalous and hermaphrodite flowers. But the receptacle is concave, and the sepals, imbricated and inserted upon the edges, are placed two in front and two behind. The stamens perigynous like the sepals, alternate with them when the same in number; but there may be also from one to four besides, which are superposed. All are composed of a subulate fila-

Petiveria alliacea.

FIG. 51.
Floriferous branch ($\frac{1}{5}$).

[1] Or little developed.

[2] MART., *Nov. Gen. et Spec. Bras.*, iii. 170.—ENDL., *Gen.*, n. 5256.—MOQ., *Prodr.*, xiii. sect. ii. 15.—*Helleria* VELLOZ., *Fl. Flum.*, i. t. 122.—*Mancoa* RAFIN., *Fl. Tell.*, n. 632 (nec WEDD.).

[3] RUIZ et PAV., *Fl. Per.*, i. 65, t. 102 (*Rivina*).—POIR., *Dict.*, vi. 215, n. 5 (*Rivina*).—SCHUM. et THÖNN., *Beskr.*, 84, n. 1.—HOOK., *Ic.*, t. 130 (*Rivina*).

[4] They have been divided into two sections, according as their fruit is dry, or scarcely fleshy, nerve-reticulated, marginate (*Hilleria*); or more or less fleshy, without a plexus of nerves and without border (*Mohlanella*).

[5] KL., in *Herb. Karst.* (ex MOQ., *Prodr.*, xiii. sect. ii. 14).

[6] *L. seguierioides* KL.—*Rivina seguierioides* KL. Found in the Antilles and in neighbouring regions of the mainland.

[7] PLUM., *Gen.*, 50, t. 39.—L., *Gen.*, n. 459; in *Act. Holm.* (1744), 287, t. 7.—J., *Gen.*, 84.—GÆRTN., *Fruct.*, i. 364, t. 75, fig. 2.—LAMK., *Dict.*, v. 223; *Ill.*, t. 272, 1.—ENDL., *Gen.*, n. 5255.—PAYER, *Organog.*, 302, t. 62.—MOQ., *Prodr.*, 8.

ment, and an anther with two sublateral cells independent of each other towards the two extremities, and dehiscing towards the edges or a little outwards by two longitudinal clefts. The gynæceum is inserted at the bottom of the receptacle, in the concavity of which it is partly lodged; it is composed of a unilocular ovary, the short eccentric style having a tendency to become gynobasic, and being crowned by a stigmatiferous penicillate apex. In the interior is a single ovule, subbasilar, erect and amphitropous, with the micropyle turned downwards and from the side of the back of the carpel.[1] The fruit is an unsymmetrical achene, narrow and elongated, accompanied at its base by the erect perianth and the persistent filaments of the stamens, while on the side are found the remnants of the style.[2] It is surmounted by from four to six prickles inserted in its upper part, and which existed upon the ovary where they were ascendent, while here they are, in hardening, reflexed upon the pericarp. The seed is suberect, narrow, folded upon itself towards the middle of its length in the same way as the embryo,[3] whose cotyledons have their apex turned back towards the radicle, which is inferior. These cotyledons are very unequal; that which touches the radicle being longer and narrower and having reflexed edges, while the other, by which it is enveloped, and whose edges are inflexed, is much thicker and shorter. A little mass of albumen accompanies the embryo, placed towards the edges and in the intervals of the two folded parts. The *Petiverias* are undershrubs of tropical America. There are two or three species[4] of them. All their parts have an alliaceous odour. Their leaves are alternate, simple, entire, petiolate, accompanied by two small lateral stipules. Their flowers are in terminal or axillary racemes, but which seem at first to be spikes, so short and thick are their pedicels; each is placed in the axil of a bract, and bears at a variable height two sterile bractlets.

Petiveria alliacea.

FIG. 52.
Flower ($\frac{3}{1}$).

[1] It has two coats, and its endostome forms a long opening which penetrates across the exostome to the outside, and presents a narrow aperture at its swollen apex.

[2] Its form is comparable to that of a grain of oats; it bears also on one side a longitudinal mesial groove, finished above by a slope; but this does not correspond to the organic apex of the fruit, which is found where the remains of the style is seen.

[3] Described wrongly by MOQUIN (*Prodr.*, xiii. sect. ii. 4) as straight; it is folded upon itself more tightly still than that of other plants of the same group.

[4] GOM., *Obs.*, (1803), 13.—FISCH. et MEY., *Ind. Sem. Hort. Petrop.* (1835), 35.

Monococcus echinophorus[1] is an Australian plant, whose vegetative organs, inflorescence and floral organization form a type nearly allied to *Petiveria*.[2] It differs from the latter inasmuch as its flowers are polygamous (and that often in the same inflorescence, where female flowers are placed below and male ones at the summit, while some hermaphrodite flowers are found between the two); the stamens also, whose summits incline downwards, are often as many as ten or twelve in number; the fruit, larger and shorter, has hooked prickles not only towards the summit but upon the whole surface in great numbers; finally its embryo, constructed moreover like that of *Petiveria*, but with cotyledons less dissimilar, is accompanied by a much more abundant albumen.

Seguieria floribunda.

FIG. 53.
Flower ($\frac{4}{1}$).

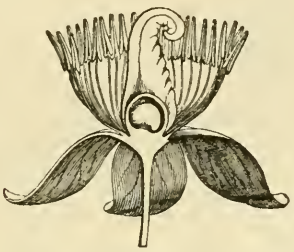

FIG. 54.
Longitudinal section of flower.

FIG. 55.
Gynæceum ($\frac{8}{1}$).

Seguieria[3] (figs. 53–57) is analogous to the preceding genera in the organization of the gynæceum, reduced also to a single carpel; but the fruit and the seed present rather striking differences, while the androceum is always composed of a large number of stamens. The calyx is regular, composed of five, more rarely of six sepals, imbricated in the bud. The stamens are nearly hypogynous, formed of a free filament and of an anther with two lateral cells, often becoming slightly extrorse, or even introrse, dehiscing by clefts near the edges. The free one-celled ovary only encloses one subbasilar campylotropal ovule with micropyle looking downwards and almost in front; it is surmounted by a flattened style, forming

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[1] *Fragm. Phyt. Austral.*, i. 47.—BENTH., *Fl. Austral.*, v. 144.

[2] Of which it could scarcely constitute simply a section.

[3] LŒFL., *It.*, 191.—L., *Gen.*, n. 676.—ADANS., *Fam. des Pl.*, ii. 443.—J., *Gen.*, 440.—ENDL., *Gen.*, n. 5254.—MOQ., *Prodr.*, 6.—*Seguiera* POIR., *Dict.*, vii. 52; Suppl., v. 124.—SPRENG., *Syst.*, ii. 605.

a species of unsymmetrical plate or tuft, whose border is stigmatiferous to a variable extent and which persists, growing and hardening, to the apex of the fruit, which is dry and indehiscent and becomes in that way a samara. Its hollow part is covered with ribs or short wings, very irregular, and containing an ascending seed enclosing a large embryo. This has a short inferior radicle and much developed foliaceous cotyledons, many times folded and crumpled. In the interval of their folds, towards the centre, a very small remnant of soft and viscous albumen is seen. From *Seguieria* has been generically separated a Brazilian species *Gallesia Gorazema*,[1] because its flowers are oftener in four than in five parts, and because of slight differences in the shape of the wing which surmounts its fruit, and in the rather more considerable quantity of the albumen which persists between the folds of the embryo; but we only consider it as a section of the same genus. In joining this species to that of the section *Euseguieria* which is found in Brazil, Guiana, and Columbia,[2] a total is obtained of some ten[3] trees or shrubs, with alternate, entire, glabrous and petiolate leaves, accompanied by two stipules, sometimes indurated or developed in hooks. The flowers are in racemes or in much ramified compound spikes; each placed in the axil of a bract, and accompanied by two lateral bractlets.

Seguieria floribunda.

FIG. 56.
Fruit.

FIG. 57.
Fruit open.

In *Adenogramma*[4] (figs. 58–62) the flowers are hermaphrodite and analogous to those of the preceding genera, for they have also five sepals, quincuncially imbricated, five stamens with introrse anthers and filaments free, or united at the base for a very short distance,

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[1] MOQ., *Prodr.*, 8.—*G. scorodendrum* CASAR., *Nov. Stirp. Bras. Dec.*, v. 43.—ENDL., *Gen.*, n. 5254[1].—*Cratæva Gorazema* VELLOZ., *Fl. Flum.*, v. t. 4.

[2] LOUREIRO has described besides (*Fl. Cochinch.*, 311), under the name of *S. asiaticus*, a doubtful species of this genus, whose fruit appears to be a bivalve (?) and surmounted by a multifid wing with linear divisions (?).

[3] BENTH., in *Trans. Linn. Soc.*, xviii. 234; in *Hook. Journ.* (1847), 482 (*Gallesia*).

[4] REICHB., *Icon. Exot.*, ii. 3, t. 109.—FENZL, in *Ann. Wien. Mus.*, ii. 254.—ENDL., *Gen.*, n. 5195.—B. H., *Gen.*, 144, 156, 858, n. 19.—*Steudelia* PRESL, *Symb.*, 1, 3, t. 2.

and a free gynæceum which appears to be formed of one carpellary leaf.[1] The one-celled ovary is surmounted by a slightly eccentric style expanded at the apex into a little stigmatiferous head. The

Adenogramma galioides.

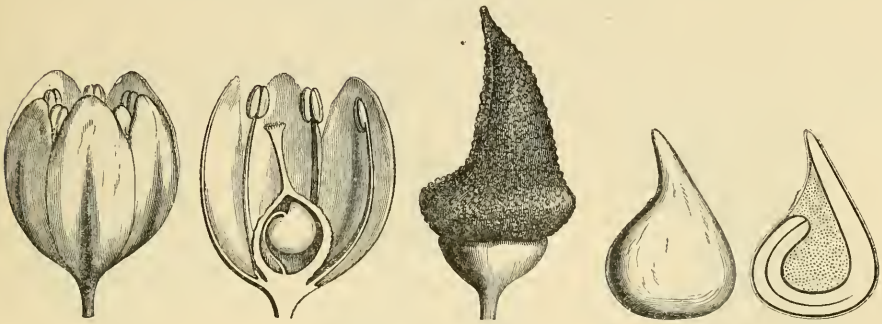

Fig. 58. Flower ($\frac{1}{1}^{0}$).

Fig. 59. Longitudinal section of flower.

Fig. 60. Fruit ($\frac{1}{1}^{0}$).

Fig. 61. Seed ($\frac{1}{1}^{0}$).

Fig. 62. Longitudinal section of seed.

placenta is subbasilar and bears a campylotropous ovule which is inserted at the summit of a slender funicle. The fruit placed on a conical dilatation at the apex of the pedicel, has the form of an unsymmetrical cone, with a thick, dry, often rugose pericarp indehiscent or opening lengthwise like a follicle. The seed, more or less bent, contains under its coats a fleshy albumen partly surrounded by an embryo fornicate or bent in the shape of a hook, the radicle being superior. The *Adenogrammas*, natives of Southern Africa to the number of half a dozen species,[2] are slender ramose herbs, whose leaves are brought together in false verticils, simple and generally narrow, with stipules little developed. In their axil, or at the summit of the branches, are found the flowers, small and numerous, arranged in cymes, often umbelliferous.

V.? THELYGONUM SERIES.

Thelygonum[3] (figs. 63–65), which constitutes by itself this small series, has monœcious flowers. In the male flowers (fig. 63) a little

[1] Because of the obliquity of the ovary and the unilateral groove observed upon the fruit.

[2] Eckl. et Zeyh., *Enum. Pl. Cap.*, 183.—Harv. et Sond., *Fl. Cap.*, i. 151.

[3] L., *Gen.*, n. 1068.—J., *Gen.*, 405.—Lamk., *Dict.*, vii. 623; *Ill.*, t. 777.—Del., in *Ann. Sc. Nat.*, sér. 1, xix. 370, t. 13.—Nees, *Gen.*, ii. 69.—Endl., *Gen.*, n. 1888.—Lem. et Dcne., *Tr. Gén.*, 506.—*Cynocrambe* T., *Inst.*, Coroll., 52, t. 485.—Adans., *Fam. des Pl.*, ii. 497.

convex receptacle bears two valvate sepals, anterior and posterior, and an indefinite[1] number of free stamens, each formed of a slender filament, and an elongated linear versatile anther, inserted towards the lower part of its back upon the apex of the filament, bilocular,

Thelygonum Cynocrambe.

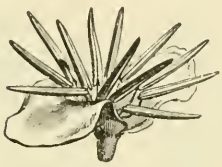

Fig. 63.
Male flower ($\frac{3}{1}$).

Fig. 64.
Female flower ($\frac{4}{1}$).

Fig. 65.
Long. section of fruit ($\frac{4}{1}$).

introrse, dehiscing by two longitudinal sublateral clefts. In the female flower there is a little gamophyllous perianth at first tubular, with a superior tridentate orifice. The enormous development which afterwards takes place in one side of the ovary, makes the perianth by which it is surrounded present on this side a great gibbosity. The gynæceum is superior and unicarpellary; it is composed of a one-celled ovary and a lateral gynobasic erect style, swollen into a club towards its stigmatiferous apex. In the ovary cell, quite close to the base, is seen a placenta, which supports an almost erect campylotropous ovule with inferior micropyle. The fruit becomes a monospermous drupe, with a thin sarcocarp; and the campylotropal seed contains under its coats a curved embryo, with narrow incumbent cotyledons, the cylindro-conical radicle with inferior apex being enveloped by a fleshy albumen more or less abundant. The only species of this genus is *T. Cynocrambe*,[2] a small annual oleraceous herb, which grows in the Mediterranean region. Its leaves are simple and petiolate, the enlarged base of the petiole expanding on each side into a sort of membranous incised stipule. The inferior are opposite, and the superior alternate. The flowers occupy their axils arranged in small

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[1] There are generally ten or a dozen, sometimes more. Their number can even be as small as two or three.

[2] L., *Spec.*, 144.—DC., *Fl. Fr.*, iii. 399.—Gren. et Godr., *Fl. de Fr.*, iii. 111.

numbers[1] as unisexual glomerules, the female flowers being accompanied by small herbaceous bracts.

VI. GYROSTEMON SERIES.

The first species known of the genus *Gyrostemon*,[2] *G. ramulosus*[3] (figs. 66–71), has diœcious regular, monoperianthous flowers. The convex

Gyrostemon ramulosus.

FIG. 67.
Male flower ($\frac{5}{1}$).

FIG. 68.
Longitudinal section of male flower.

FIG. 69.
Female flower ($\frac{5}{1}$).

FIG. 66.
Male floriferous branch.

FIG. 70.
Longitudinal section of female flower.

FIG. 71.
Dehiscent fruit ($\frac{4}{1}$).

receptacle, in the shape of a surbased dome, is, in the male flowers (figs. 66–68), quite covered with stamens, surrounded by a short

[1] Often from one to three for the males; the females are often ternate, the two lateral being younger than the mesial.

[2] DESF., in *Mém. Mus.*, vi. 16, t. 6, 7; viii. 115, t. 10.—TURP., in *Dict. Sc. Nat., Atl.*, t. 280.—DC., *Prodr.*, i. 516.—ENDL., *Gen.*, n. 5264.—LINDL., *Veg. Kingd.*, 282.—MOQ., *Prodr.*, 38.—H. BN., in *Adansonia*, x. 156, t. 5 (incl. : *Codonocarpus* A. CUNN., *Cyclotheca* MOQ., *Hymenotheca* F. MUELL.).

[3] DESF., *loc. cit.*, t. 6, 7, 10, fig. a.—BENTH., *Fl. Austral.*, v. 147, n. 3.

gamosepalous calyx cut upon the margin into a variable number[1] of unequal teeth, primitively imbricated.[2] The stamens are arranged in several concentric circles. They are free, each consisting of an almost sessile erect anther of an angular form surmounted by an obtuse prolongation of the connective. The two adnate lateral cells open upon the side by two longitudinal clefts.[3] In the female flower (figs. 69, 70) the calyx is nearly the same, and surrounds the base of a superior gynæceum formed of a verticil of from twenty to thirty carpels surrounding a central axile[4] column. Each of them is composed of a one-celled ovary, attenuated above into a narrow style[5] stigmatiferous above and within. In the interior angle of the ovary is a placenta supporting an ascending ovule, anatropous at first, then pseudo-campylotropous,[6] with the micropyle looking downwards and outwards.[7] The fruit is almost spherical, formed of a great number of follicles which surround the central columella, from which they are detached sooner or later. Each opens longitudinally according to the mesial line of its dorsal lobe, to let a pseudo-campylotropal seed escape, provided, like the ovule, with a fleshy aril occupying its lower extremity,[8] and containing under its coats a fornicate peripheral embryo with conical inferior dorsal radicle, and narrow accumbent cotyledons. The embryo surrounds a more or less abundant farinaceous albumen.[9] *G. ramulosus* is an erect ramified glabrous shrub, with alternate leaves slightly fleshy, linear, subcylindrical, subulate, articulate at the base, and accompanied by two small lateral stipules. The flowers are axillary, solitary, pedunculate, accompanied by two lateral bractlets.

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[1] There are generally from six to eight.

[2] In the young bud the narrowest are interior and partly covered by the larger.

[3] In this plant, as in several others of the same genus, the lines of dehiscence of the two neighbouring anthers touch each other; and when they open, the masses of pollen which belong to the two different anthers often stick to each other, and are detached thus under the form of a bilobate body.

[4] Here the apex of this column is scarcely prominent at the centre of the styles at the adult age. When the young buds are examined, it is seen that the receptacle has the form of a thick cone, the summit surpassing all the young carpels ranged in a circle round the base.

[5] It is first incurved above except at its extreme apex, pointed and slightly reflexed (figs. 69, 70).

[6] See, for the singular organization of this ovule and the seed which succeeds it, *Adansonia*, x. 157.

[7] Its lower extremity bears already an arillate swelling (fig. 70).

[8] The arillate production occupies at the same time the place of the micropyle and that of the hilum; it even extends in certain species to the periphery of the funicle.

[9] In certain species it is rather fleshy and less thick. The embryo is often coloured a pale green.

In other species of the same genus as *G. Cyclotheca*,[1] the general organization is the same; but the stamens, from six to twelve in number, only form a single verticil, and leave free to the centre of the flower a prolongation of the summit of the receptacle in the form of a column. As to the carpels, less numerous[2] than in *G. ramulosus*, they open early by their dorsal and ventral edges, and leave naked a long central columella, at the apex of which the styles persist, radiated like a star.[3] The vegetative organs are the same.

Gyrostemon (*Codonocarpus*) *pyramidalis*.

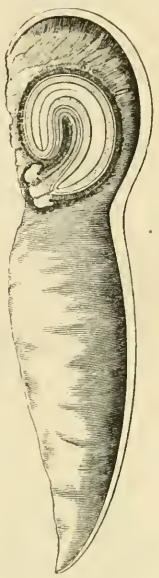

FIG. 72.
Longitudinal section of ripe carpel ($\frac{1}{1}^{0}$).

In *G. pyramidalis*[4] (fig. 72), considered as a particular genus under the name of *Codonocarpus*,[5] the vegetative organs are always the same, but the fruit changes a little in form. Its base is more attenuated into a sort of reversed cone, and the numerous carpels which constitute it, after being detached from the central columella, only open lengthwise by their thinned and membranous inner edge. The organization of the fruit is the same as in *G. attenuatus*[6] and *cotinifolius*,[7] but the leaves, instead of being linear, are flattened, membranous, lanceolate and obovate. The flowers are axillary, as in *G. ramulosus*, but the leaves whose axil they occupy are often replaced by bracts, so that the inflorescence may become a raceme or a spike. The six known species of the genus *Gyrostemon* are Australian and frutescent.[8]

Beside *Gyrostemon* are placed *Tersonia* and *Didymotheca*, which

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[1] BENTH., *Fl. Austral.*, v. 146, n. 2.—*G. ramulosus* SCHLTL, in *Linnæa*, xx. 632 (nec DESF.).—*Cyclotheca australasica* MOQ., *Prodr.*, 38.—*Didymotheca pleiococca* F. MUELL., *Pl. Vict.*, i. 198, t. Suppl. 9.

[2] There are sometimes from four to six.

[3] At the centre of which a little cone, the apex of the columella, is prominent.

[4] F. MUELL., in *Linnæa*, xxv. 438.—*Hymenotheca pyramidalis* F. MUELL., *Fragm.*, i. 202.

[5] A. CUNN., ex HOOK., *Bot. Misc.*, i. 244.—ENDL., *Gen.*, n. 5265.—MOQ., *Prodr.*, 39.—BENTH., *Fl. Austral.*, v. 147.—*Hymenotheca* F. MUELL., *Fragm.*, *loc. cit.*

[6] HOOK., *Bot. Misc.*, i. 244, t. 53.—*Codonocarpus australis* BENTH., *Fl. Austral.*, v. 148, n. 2.

[7] DESF., in *Mém. Mus.*, viii. 116, t. 10.—MOQ., *Prodr.*, 39, n. 2.—*G. pungens* LINDL., in *Mitch. tree Exped.*, ii. 121.—*G. acerciæformis* F. MUELL., in *Linnæa*, xxv. 439.—*Codonocarpus cotinifolius* F. MUELL., *Pl. Vict.*, i. 200.—BENTH., *Fl. austral.*, v. 148, n. 3.

[8] Except perhaps *G. subnudum* (*G. brachystigma* F. MUELL., ex BENTH., *Fl. Austral.*, v. 146, n. 1;—*Amperea? subnuda* NEES, in *Pl. Preiss.*, ii. 229), of which only the tops are known.

ought perhaps to be distinguished only by the title of sections. *Tersonia*[1] has the dicœcious flowers of *Gyrostemon*, with less numerous stamens arranged upon a single verticil. But the fruit

Didymotheca thesioides.

Fig. 74.
Female flower ($\frac{10}{1}$).

Fig. 76.
Dehiscent fruit ($\frac{12}{1}$).

Fig. 75.
Longitudinal section of female flower.

Fig. 73.
Female floriferous branch.

Fig. 77.
Seed ($\frac{12}{1}$).

instead of being formed of free carpels is constituted of some twenty cells with thick walls,[2] united in a woody mass, and quite indehiscent. One or two Australian[3] *Tersonias* are known, the vegetative organs being the same as those of the *Cyclostemon ramulosus*.

Didymotheca[4] (figs. 73–77) represents a lessened type of *Gyrostemon*, in which the flowers are dicœcious and tetramerous. The perianth is there represented by a small calyx with four deep

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[1] Moq., *Prodr.*, 40.—*Gyrandra* Moq., (ol., nec Wall.), *loc. cit.*

[2] Traversed at its exterior surfaces by projecting wrinkles circular and horizontal.

[3] Benth., *Fl. Austral.*, v. 149.

[4] Hook. f., in *Hook. Journ.*, vi. (1847), 278. —Moq., *Prodr.*, 36.

lobes, of which the two lateral are narrower and longer than the other two.[1] More internally are found, in the male flowers, eight or nine stamens reduced to subsessile anthers, erect, with two lateral cells dehiscing by a longitudinal and marginal cleft. In the female flowers there is but one free gynæceum; the ovary has two lateral uniovulate cells and is surmounted by a style with two thick fleshy branches stigmatiferous within. The ovule is ascendant with inferior and exterior micropyle. The fruit is dry, with two compressed cells separating from the central columella and opening lengthwise by their exterior edge to let an ascendant reniform arillate[2] seed escape, partly surrounded by a fornicate embryo with inferior radicle. The *Didymothecas*, of which only one species is known,[3] are small suffrutescent Australian and Tasmanian plants, with slender erect branches, bearing alternate, simple, narrow, entire leaves,[4] accompanied by two small glandular stipules. They are succeeded by bracts towards the summit of the branches, each presenting in its axil a small flower with short pedicel. The bracts have also two small glandular stipules[5] at the base.

R. Brown[6] established in 1818 a special family for *Phytolacca* and the neighbouring genera. Before this the greater part of the known genera were connected with *Chenopodaceæ*. A. L. de Jussieu,[7] for example, placed in his order of *Arroches* (*Oraches*), *Phytolacca*, *Rivina*, *Petiveria*. Moreover he placed *Giseckia* and *Limeum* among the *Portulaccaceæ*,[8] and left *Seguieria* in the *Genera insertæ sedis*.[9] Endlicher[10] ranged in his order of *Phytolaccaceæ*, *Seguieria*, *Petiveria*, *Mohlana*, *Rivina*, *Limeum*, *Giesekia*, *Phytolacca*, *Ercilla*, also *Semonvillea*, a section of *Limeum* and *Microtea*, which ought rather to be

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[1] These last are entire, or more or less unequally parted into two teeth or secondary lobes.

[2] The aril has for starting point a thickening of the exostome, which is produced even before anthesis. (See *Adansonia*, x. 161.)

[3] *D. thesioides* Hook. f., *loc. cit.* 279; *Fl. Tasm.*, i. 309, t. 93.—Moq., *loc. cit.*, 37.—Benth., *Fl. Austral.*, v. 145.— *D. Drummondii* Moq., *loc. cit.*, n. 2.—*D. veroniciformis* F. Muell., in *Linnæa*, xxv. 438.

[4] Spotted with small white specks which appear to be cystolites.

[5] Described as lateral bractlets by a great number of authors, but identical with the bracts of the leaves.

[6] *Obs. Herb. Congo*, 35; *Misc. Works* (ed. Benn.), i. 138 (*Phytolaceæ*).

[7] *Gen.* (1789), 83, Ord. 6.

[8] *Op. cit.*, 314, Ord. 4.

[9] *Op. cit.*, 440.

[10] *Gen.*, 975, Ord. 208 (1840).

connected with the *Salsolaceæ*. He enumerated besides, *Gyrostemoneæ* in connexion with the *Phytolaccaceæ;* they were ranged after the *Euphorbiaceæ* by LINDLEY,[1] who distinguished into two very different orders the *Petiveriaceæ*[2] (*Petiveria, Seguieria, Gallesia*), and the *Phytolaccaceæ*,[3] to which he joined the genus *Stegnosperma*, recently established by BENTHAM.[4] MOQUIN-TANDON, who in 1849 formed the first complete monography of the group *Phytolaccaceæ*,[5] divided it into eight tribes: *Seguierieæ*, which are the *Petiveriaceæ* of LINDLEY; *Rivineæ*, comprising, besides *Rivina* and *Mohlana*, the genus *Ledenbergia* of KLOTZSCH;[6] *Microteæ* (with the single genus *Microtea*); *Limeæ*, which comprises, besides *Limeum* (and *Semonvillea*) the *Anisomeria* of DON;[7] the *Giseckieæ*, of which *Giseckia* is the type, and by which it is connected with *Phytolacca*, *Pircunia* and *Ercilla;* the *Stegnospermeæ* (*Stegnosperma*); *Gyrostemoneæ*, formed of different genera united by us to *Gyrostemon* (*Codonocarpus*,[8] *Cyclotheca*), and of *Didymotheca*;[9] and *Tersonieæ*, represented by the single genus *Tersonia*. Since then we have connected[10] with *Phytolaccaceæ*, as the type of a special series, the *Barbeuia* of DUPETIT-THOUARS,[11] doubtfully attributed to *Rosaceæ*.[12] The *Agdestis* of SESSE AND MOÇINNO has been indicated[13] as belonging to the *Phytolaccaceæ*, where it forms a special series on account of the form of its receptacle and its inferior ovary; and the ancient genus *Thelygonum* has appeared to us, not without some doubt, capable of being connected as the title of a distinct series with the *Phytolaccaceæ* with unicarpellary gynæceum, like the *Rivinaceæ*. Thus we find assembled in this small family eighteen genera grouped in six series and comprising about seventy-five species. All those, eight or nine in number, which constitute the *Gyrostemon* series are Australian. It has also the only known species of the genus *Monococcus*. To America belong exclusively all the *Ercillas*, *Anisomerias*, *Agdestideæ*,

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[1] *Veg. Kingd.* (1846), 282.

[2] *Nat. Syst.*, ed. 2, 212.—*Veg. Kingd.*, 386, Ord. 137.—LINK, *Handb.*, i. (1829), 312.—*Petivereæ* AG., *Class.* (1835), 221.

[3] *Nat. Syst.*, ed. 2, 210.—*Veg. Kingd.*, 508, Ord. 193.—*Rivineæ* AG., *op. cit.*, 218.

[4] *Voy. Sulph., Bot.*, 17 (1844).

[5] In *DC. Prodr.*, xiii. p. ii. 2, Ord. 156.

[6] In *Pl. Karst. exs.* (1846), ex MOQ., *Prodr.*, 14.

[7] In *Edinb. New Phil. Journ.*, xiii. (1832).

[8] A. CUNN., ex HOOK., *Bot. Misc.*, i. (1830).

[9] HOOK. F., in *Hook Journ.*, vi. (1847).

[10] In *Adansonia*, iii. 312 (1863).

[11] *Gen. Madag.* (1863).

[12] By SPRENGEL. It has also been connected with *Bixaceæ* and *Tiliaceæ* (DUP.-TH.) with *Euphorbiaceæ* (MEISSN.).

[13] B. H., *Gen.*, 33 (1862).

Ledenbergias, *Petiverias*, and *Seguierias*,[1] representing at most a total of twenty species.[2] *Thelygonum* is limited to the Mediterranean region; *Barbeuia* to Madagascar; *Adenogramma* to Southern Africa; *Giseckia* and *Limeum* to Asia and to tropical Africa. *Mohlana* and the *Rivinas* are common to the two Worlds, but abounding particularly in the New. As to the *Phytolaccas* there is not a warm country of the world where they are not represented from Mexico to Chili and from China to Australia. But *P. octandra* seems only to have been introduced into this last country, as has also *P. decandra* into the Mediterranean region; this latter is considered a native of America.

All the *Phytolaccaceæ* have characters in common; alternate, simple leaves;[3] uniovular carpels; ascendant ovules, with inferior, exterior micropyle; a non-rectilinear embryo, fornicate, uncinate, circinate, involute, or folded a variable number of times upon itself. Other characters are found among them very generally, with a very small number of exceptions. These are indefinite inflorescence,[4] the independence of the carpels,[5] the apetalous character of the flowers,[6] and the presence of an albumen[7] within the embryo. Other more variable characters are, the form of the receptacle[8] (and consequently the mode of insertion), the number of the carpels, and the union or separation of the sexes in the same flower. Upon them are founded the following series, arranged by us, and easy to distinguish from each other:—

I. PHYTOLACCEÆ.—Two or several carpels, quite free, or to a great extent (at least at a certain age), inserted on a convex receptacle. Stamens hypogynous. (5 genera.)

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[1] LOUREIRO (*Fl. Cochinch.*, 341) has described, it is true, a *S. asiatica* (MOQ., *Prodr.*, 7, n. 10); but nothing is less certain than the genus of this plant (see p. 38, note 2).

[2] Those of the genera *Anisomeria* and *Petiveria* seem to have been multiplied without measure.

[3] In general they are fetid and become black by desiccation.

[4] There are only cymes in *Giseckia*, *Limeum*, *Agdestis* and *Adenogramma*.

[5] Which is only wanting in *Agdestis* and *Barbeuia*.

[6] The organs described as petals in certain species of *Limeum*, may have quite another signification.

[7] Even in *Seguieria*, whose embryo occupies by its numerous folds almost all the interior of the seed, there are often traces of a mucous albumen between the folds.

[8] Convex in most of the genera, quite concave in *Agdestis*, slightly hollow in most of the species of the genera *Seguieria* and *Petiveria* which show the commencement of a perigynous arrangement.

II. Barbeuieæ.—Two superior carpels united in one ovary with two cells. Hypogynous stamens. (1 genus.)

III. Agdestideæ.—Four inferior carpels placed in a concave receptacle, and united among themselves. Epigynous stamens. (1 genus.)

IV. Rivineæ.—One single free carpel. Hypogynous or perigynous stamens. (7 genera.)

V. Thelygoneæ.—One single free carpel, surrounded by a gamophyllous calyx. Monœcious unisexual flowers. (1 genus.)

VI. Gyrostemoneæ.—Two or several superior carpels inserted within upon a central columella, free upon the sides, or rarely united. Flowers unisexual-diœcious. (3 genera.)

By the unicarpellary types, such as the *Rivineæ*, the *Phytolaccaceæ* nearly approach the *Nyctaginaceæ*. They are apetalous, they have the single carpellary leaf, a subbasilar but posterior placenta, and a seed with farinaceous albumen and peripheral embryo; but they are distinguished by the absence of the perianth peculiar to the *Nyctaginaceæ*, whose petaloid limb resembles a corolla, and whose indurated base plays round the fruit the part of an almost closed accessory pericarp. The unicarpellary *Phytolaccaceæ* have been compared to the *Salsolaceæ*, *Polygonaceæ*, &c., but in these the placentation is basilar, and the number of carpellary leaves is more than one.[1] They have also been compared, through the medium of *Limeum* and *Giseckia*, to the *Portulaceæ*, *Molluginæ*, and *Mesembrianthemeæ*, which are distinguished also by their pluricarpellary gynæceum and their mode of placentation.[2] At the other extremity of the family, *Phytolacca* and *Gyrostemon*, with their gynæceum representing a verticil with numerous carpels, intimately connected, as established by several modern authors,[3] the *Phytolaccaceæ* to the *Malvaceæ*, which are distinguished, moreover, by the organization of their perianth, often double, by their androceum, by their fruit, by their seed, and by their embryo.

By their histologic organization the *Phytolaccaceæ* equally resemble

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[1] The *Salsolaceæ* cannot be absolutely distinguished by the indefinite number of their stamens.

[2] By its inferior ovary *Agdestis* resembles *Tetragonia* and certain species of *Portulaeca* and *Mesembriantheum*. Lindley connects *Petiveraceæ* and *Sapindaceæ*.

[3] See Endl., *Gen.* 978.—Moq., *Prodr.*, 3. —M. J. G. Agardh (*Theor. Syst.*, 367), find the analogy less.

several families with which they are connected by their flowers and fruit. Like the Marvels of Peru, the herbaceous *Phytolaccaceæ* often have a tap-root filled with feculæ and resinous substances. As to their stems they present also in their thickness numerous concentric circles of fibro-vascular fascicles, whose presence has induced several authors[1] to cite these stems as an example of the formation of several layers of wood in one and the same period of vegetation. The concentric layers, more or less regular, are separated by circular ones of parenchymatous[2] tissue. Here also the bundles are distributed more internally than the wood proper, and consequently the pith is riddled[3] by them. When the bundles, which alternate with the medullary rays in a given layer, alternate at the same time with those of a neighbouring zone, as in *P. esculenta, icosandra,* &c.,[4] the fibro-vascular bundles of one zone seem to continue the medullary rays of the more interior and of the more exterior zone. This arrangement is observed also in some other genera of *Phytolaccaceæ.*

The uses[5] of these plants are not numerous. The most useful are, without doubt, the *Phytolaccas,* especially *P. decandra*[6] (figs. 21–28), which is an evacuant drug. Its root (fig. 28) has been employed as a substitute for the purgative *Convolvulaceæ* under the name of *Méchoacan du Canada.*[7] Its leaves are acrid, and its fruit is an active purgative before attaining maturity. It is said that even the flesh of pigeons which feed on it becomes laxative; and it is doubtless quite right that the use of these fruits in colouring food and beverages should be proscribed. The same properties are found in *Anisomeria drastica*[8] of Chili, whose root is slightly bitter when masticated, but rich in a resinous substance producing powerful evacuant effects. These plants have also an irritant action when

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[1] Ch. Mart., in *Rev. Hort.* (1855), 122.—Oliv., *Stem in Dicot.*, 28.

[2] Also M. Nægeli (*Beitr. z. Wiss. Bot.*, i. 14) cites them as examples of Dicotyledones which have limited rings of cambium in the *épenchyme.*

[3] Trevir., in *Bot. Zeit.* (1856), 833.

[4] Regn., in *Ann. Sc. Nat.*, sér. 4, xiv. 139.

[5] Endl., *Enchirid.*, 509. — Lindl., *Veg. Kingd.*, 508; *Fl. Med.*, 351. — Rosenth., *Syn. Pl. Diaphor.*, 702.

[6] See p. 24, note 1 (*Pocan, Garget, Cocum* of the United States).

[7] "*Mechoacanna spuria s. canadensis.*" Bigelow (*Med. Bot.*, i. t. 3) cites this plant as acting like Ipecacuanha, as Antirheumatical, but at the same time as acrid, and narcotic, &c.

[8] Moq., *Prodr.*, 25, n. 2.—*Phytolacca drastica* Pœpp. et Endl., *Nov. Gen. et Spec.*, 26, t. 43, 44.—*Pircunia suffruticosa* Bert. The same properties exist in *A. littoralis,* which is perhaps only a variety of it.

employed topically. Hence perhaps the effects obtained in the treatment of itch and intestinal worms with *P. decandra*. The root and the fruit of *P. abyssinica*[1] are considered a powerful tenifuge in the native country of this species. The *Petiverias* are equally acrid and irritant. The leaves of *P. alliacea*[2] (figs. 51, 52) are employed in tropical America as depurative sudorifics; fumigations are made of it in the treatment of paralysis. In the Antilles the root is applied to decayed teeth; it has the reputation of being a powerful abortive. The root of *Pipi*, attributed to *P. tetrandra*[3] of Brazil, is used in the preparation of baths and lotions for the treatment of paralysis attributed to cold and weakness of muscular contractility. The strong alliaceous odour of these plants is found in *Seguiera*, which in Brazil enters also into the composition of baths administered in cases of dropsy and of rheumatic and hæmorrhoidal affections. A decoction of the leaves and young branches is used topically in the treatment of affections of the urinary channels.[4]

The *Phytolaccaceæ* have several industrial uses. The berries of the *Rivinas* furnish a rich red dye. The colouring matter of the fruit of *Phytolacca dioica* can be used in the same way. It is said that these berries are employed in the South of Europe to colour wines, especially those of Oporto, and some other drinks. Their juice is used to colour sweetmeats, papers, and several silk, woollen, and cotton stuffs. The Indian women use it with safety in painting their faces. The leaves enter into the composition of a rose lake, and of red ink. *Thelygonum Cynocrambe* (figs. 63–65) is rich in alkaline salts, as the Glass-worts and the Chenopods (Goosefoot family). The wood of *Seguiera* contains much potassium, and the cinders for this reason are used in America in the clarification of sugar and in the manufacture of soap. The flexible branches of

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[1] Hoffm., in *Comm. Gœtt.*, xii. 28, t. 2.—*P. dodecandra* Lhér., *Stirp.*, i. 143, t. 69.—*Pircunia abyssinica* Moq., *Prodr.*, 30, n. 4.—Fourn., *Tænifuges employed in Abyssinia* (1861), 60 (vulg. *Scheblé*). It has been thought that this plant may be the arborescent *Sénevé* spoken of in Scripture [see Frost, in *Journ. Sc. Inst. Roy.* (1825), 69], which, according to some others, is a *Salvadora*.

[2] L., *Spec.*, 486, n. 1.—Moq. *Prodr.*, 9, n. 1.—Guib., *Drog. Simpl.*, éd. 6, ii. 445.—*P. octandra* L., *Spec.*, n. 2 (vulg. *Guiné, Raiz de Guiné, Herbe aux poules de Guinée, Pipi*).

[3] Gom., *Obs. Med. Bot. Pl. Bras.* (1803), 13.—Moq., *Prodr.*, 10, n. 4.—? *P. hexaglochin* Fisch. et Mey., *Ind. Sem. Hort. Petrop.* (1835), 35.

[4] *S. floribunda*, commonly named the *Cipo d'Alho*, is principally employed. (Benth., in *Trans. Linn. Soc.*, xviii. 235, n. 4, t. 19;—Moq., *Prodr.*, 7, n. 6;—Rosenth. *op. cit.*, 702).

Rivina octandra[1] are used in St. Domingo to hoop casks. Those of *Seguiera* (?) *asiatica*[2] are used also as bands in Cochin China. Several species of this group are oleraceous and alimentary. In Mexico the leaves of *Thelygonum* are eaten as Spinach, as are also those of *Phytolacca octandra;* those of *P. esculenta*,[3] as Asparagus in the United States, and in the Himalayas the shoots of *P. decandra* and *acinosa* are used in the same way. *P. decandra* and several beautiful species of the section *Pircunia*,[4] such as *P. dioica*, *stricta*, are cultivated as ornamental plants. *Ercilla volubilis* serves to grace the walls of our greenhouses, and several *Rivinas* are ornamental by their coloured leaves and scarlet berries.

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[1] L., *Spec.*, 177, n. 1.—Moq., *Prodr.*, 11, n. 2.—*R. dodecandra* Jacq.—*R. scandens* Mill. —*R. Mutisii* W.—*R. Ehrenbergiana* Kl.—*R. Moritziana* Kl. (vulg. *Liane à barils*, in the Antilles; *Guacomaya*, in Columbia).

[2] See p. 38, note 2; 47, note 1.

[3] V. Houtte, *Fl. des Serr.*, iv. (1848), 3986 —Moq., *Prodr.*, 460.

[4] Vulg. *Bel. ombra, Bel sombra.*

GENERA.

I. PHYTOLACCEÆ.

1. **Phytolacca** T.—Flowers hermaphrodite or more rarely dicœcious (*Pseudolacca*) calyx 5-partite; lobes herbaceous or petaloid, in fruit subaccrescent, persistent erect or reflexed. Stamens rarely 5, alternisepalous, oftener 10 alternating by pairs with the sepals, or 15–30; interior 5–20 oppositisepalous; filaments subulate; anthers introrse 2-locular longitudinally rimose. Carpels 4, 5, verticillate, or 10, of which 5 are alternisepalous, more rarely 8–15, free (*Pircunia*) or more or less connate at the base. Styles same in number, recurved at the apex, stigmatiferous within; ovules 1 in each ovary, subbasilar ascendant campylotropous; micropyle inferior and exterior. Fruit in carpels 4–10 (or rarely more) fleshy or baccate, constant, either quite free (*Pircuniastrum*), or at the base (*Pseudolacca*), or thence nearly to the apex connate into a depressed globose berry, costate (*Euphytolacca*) or ecostate (*Omalopsis*). Seed solitary in each cell, suberect, campylotropous sublenticular, glabrous; testa crustaceous; embryo annular peripheral, radicle descending; cotyledons narrow incumbent; albumen central, copious farinaceous.—Herbs, undershrubs or rarely shrubs, sometimes climbing. Roots napiform or fusiform; leaves alternate entire petiolate; flowers in terminal racemes oppositifolius or lateral; sometimes erect (*Euphytolacca, Pircuniastrum*), sometimes pendulous (*Pseudolacca*) or at apex nutant; bracts 1-flowered; bractlets 2, inserted at a greater or less height on the pedicel (*All the Tropical and Subtropical regions of the Globe*). See p. 23.

2 ? **Ercilla** A. Juss.—Flowers nearly of *Phytolacca*; calyx membranous, finally patent. Stamens 5–10; carpels free, torus stipiform finally subbaccate. Other characters of *Phytolacca*. Glabrous shrubs; stem volubilis; leaves alternate entire; flowers in racemes; bractlets 2, inserted at the summit of the pedicel (*Peru, Chili*). See p. 26.

3? **Anisomeria** Don.—Flowers nearly of *Phytolacca* (or *Ercilla*) irregular; calyx subcoriaceous-herbaceous, lobes 5, unequal (3 superior larger). Stamens 10–30 subsecund more developed on the posterior side of the flower, inserted on fleshy disc. Carpels 2–6 free (or more rarely 1) inflated-reniform indehiscent. Seed suberect; testa membranous; embryo peripheral uncinate hippocrepiform.—Shrubs or herbs; root usually napiform; stems erect; leaves alternate simple; flowers in terminal racemes (*Chili*). See p. 27.

4. **Giseckia** L.—Flowers hermaphrodite or polygamous, apetalous; sepals 5, membranous at margin, imbricated. Stamens 5, alternate, or 10–15; filaments free or connate at base; anthers oblong 2-locular introrse dehiscing by sublateral clefts. Carpels 5 (or more rarely 3), oppositisepalous, free; ovary unilocular; style short decurrent with the carpels at inner angle, apex and interior sulcate stigmatiferous; ovule 1, subbasilar, ascending; micropyle exterior and inferior. Fruit-carpels often 5, free, membranous venose, papillose, indehiscent. Seed ascendant subreniform; testa crustaceous granular; aril very small; embryo annular, encircling farinaceous albumen.—Diffuse herbs, usually annual; branches prostrate; leaves opposite or in narrow pseudo-verticils, filled with cystolites, exstipulate; flowers small in axillary cymes or glomerules (*Asia and Tropical Africa*). See p. 27.

5. **Limeum** L.—Flowers hermaphrodite or more rarely polygamous usually 5-merous; sepals herbaceous, membranous at margin; præfloration imbricate. Petals (?) 5 of variable form, or 4, 3, more rarely 0; stamens 5, oppositisepalous, or 6–10; filaments dilated at base into a slightly connate cupule; anthers introrse, 2-locular longitudinally rimose. Carpels 2; germen compressed 1-locular, 1-ovulate; styles 2, dilated stigmatiferous at apex; ovules suberect campylotropous; micropyle lateral inferior; funicle short erect. Fruit 2-coccous, parting into orbicular cocci dorsally compressed, sometimes apiculate at centre, smooth or rugose, sometimes the margins dilated into reticulate wings (*Semonvillea*), interior flat, sometimes membranous fenestrate. Seed suberect vertical; testa membranous; embryo annular, encircling a farinaceous albumen; radicle inferior.—Annual or perennial herbs; branches slender;

leaves alternate, fleshy, narrow, entire, ciliate, exstipulate; flowers in axillary cymes, 3-bracteate; sometimes in terminal racemose cymes (*Tropical and West. Asia, Tropical and South Africa*). See p. 29.

II. BARBEUIEÆ.

6. **Barbeuia** Dup.-Th.—Flowers hermaphrodite regular; receptacle slightly convex. Sepals 5, imbricated. Stamens ∞, hypogynous. Filaments free, inserted on annulus of receptacle; anthers 2-locular, introrse, longitudinally 2-rimose. Germen superior, 2-locular; styles 2-partite; lobes erect, thick, interior stigmatiferous; one ovule in each cell, subbasilar amphitropous; micropyle inferior lateral. Fruit, "capsular 2-lobed, 2-locular; cells 1-spermous; seeds semi-arillate."—Sarmentose glabrous shrubs; leaves alternate, entire petiolate, articulate at base. Flowers in short, rigidly compressed axillary racemes; pedicels alternate, apices swollen (*Madagascar*). See p. 30.

III. AGDESTIDEÆ.

7. **Agdestis** Moç. and Sess.—Flowers hermaphrodite, 4-merous; receptacle obconical, concave. Sepals 4, inserted on the margin of receptacle; præfloration alternate imbricate. Stamens ∞ (of *Barbeuia*), epigynous. Germen adnate to interior of receptacle 4-locular; cells opposite sepals; one ovule in each cell, subbasilar, ascending; micropyle exterior inferior; style erect in column, apex 4-fid; lobes reflexed, stigmatiferous within. Fruit...?—A climbing shrub; leaves alternate, petiolate, cordate; flowers axillary, or arranged in terminal ramified racemose cymes; pedicels 2-bracteolate (*Mexico*). See p. 32.

IV. RIVINEÆ.

8. **Rivina** Plum.—Flowers regular, hermaphrodite; receptacle conical, depressed. Sepals 4, imbricated, subpetaloid, finally virescent, persisting. Stamens either 4, alternisepalous, or 8–12 (4–8 interior); filaments free or connate at base, persistent; anthers introrse, 2-rimose. Germen 1-locular; style eccentric, slender or insignificant,

apex capitate stigmatiferous, 1, 2-lobed; ovule 1, subbasilar ascending campylotropous; micropyle inferior anterior. Fruit baccate, sometimes finally exsuccous; seed suberect; testa glabrous or scabrous; embryo annular peripheral, encircling central farinaceous albumen; cotyledons unequal, exterior larger, involving smaller.—Undershrubs; stem erect, sometimes climbing; leaves alternate petiolate, simple, entire, or crenulate; stipules 0 or very minute; flowers in terminal racemes finally lateral, or sub-leaf-opposed; bracts alternate, 1-flowered; bractlets 2, laterally inserted towards the apex of the pedicel (*Warm or Temperate America, India?*). See p. 33.

9. **Mohlana** Mart.—Flowers hermaphrodite; calyx irregular 4-fid, anterior lobe almost free at the base; the other, on the contrary, as if in one, unequal 3-lobed (middle lobe largest) connate, imbricate. Stamens 5 (of *Rivina*), alternating with lobes of the calyx. Germen and ovule of *Rivina;* style sublateral short; apex truncate, subcapitate stigmatiferous. Fruit surrounded by erect calyx, either subfleshy immarginate (*Mohlanella*), or subcoriaceous exsuccous longitudinally reticulate-nerved at margin (*Hilleria*). Seed of *Rivina*.—Undershrubs or herbs; leaves alternate petiolate; stipules minute; flowers in simple terminal or leaf-opposed racemes; pedicels 1-bracteate, at the apex 2-bracteolate (*Warm America, Tropical Western Africa, Madagascar*). See p. 35.

10. **Ledenbergia** Kl.—Flowers hermaphrodite regular; sepals 4, imbricate. Stamens 10–12, of which the 4 exterior alternate with sepals; filaments filiform; anthers oblong. Ovary and ovule of *Rivina;* style thick, curved; apex capitellate papillose-penicillate. Fruit encircled by the greatly accrescent rotate expanded membrano-nerved sepals, subcoriaceous nerved, indehiscent. Seed nearly of *Rivina*.—Volubile undershrubs; leaves alternate, petiolate; stipules very small; flowers in axillary racemes, solitary or 2-nate pendulous; pedicel 1-bracteate, with 2 bractlets very small inserted at apex (*Central America*). See p. 35.

11. **Petiveria** Plum.—Flowers hermaphrodite, 4-merous; receptacle obconical, concave. Sepals 4, of which the 2 anterior rise from the edge of receptacle, imbricate, afterwards open, finally erecto-adpressed to fruit. Stamens either 4, alternisepalous, or 5–8, interior

ones 1–4, opposite; filaments subulate perigynous; anthers 2-locular; cells linear, lateral or subextrorse, base and apex free, rimose at margin. Ovary free, inserted at bottom of receptacle, 1-celled; style short, lateral, base decurrent in ovary (subgynobasic), apex stigmatiferous penicillate; ovule subbasilar amphitropous. Achenes unequally carinate, afterwards at apex emarginate-sub-2-lobed and with style laterally mucronulate, lobes produced in bristles 2, 3, rigid, finally adpressed reflexed. Seed linear, suberect, generally amphitropous; albumen scanty, laterally produced between cotyledons; radicle of embryo inferior, cotyledons foliaceous, dissimilar, unequally replicato-convolute.—Undershrubs; odour alliaceous; leaves alternate, entire, petiolate; stipules small, herbaceous. Flowers in terminal axillary racemes, 1-bracteate; pedicels short, rather thick, bearing 2 bractlets inserted at a greater or less height (*Tropical America*). See p. 35.

12? **Monococcus** F. Muell.—Flowers polygamous, 4- or more rarely 5-merous (nearly of *Petiveria*). Stamens 10–12, free; anthers acute at apex, reflexed at summit of filaments, finally erect extrorse. Ovary unequally ovate; lateral penicillate style and ovule of *Petiveria*. Unsymmetrical achene, with style laterally mucronate, covered with prickles on all sides. Seed suberect, much amphitropous; embryo (shorter) of *Petiveria;* albumen farinaceous, copious.—An undershrub; leaves, inflorescence, and bracts of *Petiveria;* flowers inferior female; superior male; a few hermaphrodite interposed (*Australia*). See p. 37.

13. **Seguieria** Lœfl.—Flowers regular, apetalous, 5- or more rarely 4-merous (*Gallesia*); sepals more or less petaloid, imbricated, fructification reflexed. Stamens ∞, subhypogynous; anther cells 2, base and apex free, lateral or finally slightly extrorse or introrse, marginally rimose. Ovary free; ovule subbasilar, amphitropous; style eccentrically crested or winged, apex straight or incurved; one margin sulcate, stigmatiferous to a greater or less height. Fruit samaroidal, outwardly undulate-nerved or slightly winged, crowned by style accrescent in a large hatchet or shield-shaped veined wing. Seed vertical; testa membranous; embryo peripheral, radicle inferior; cotyledons wide, foliaceous, more or less convolute-corrugate; albumen scanty between the central folds of cotyledons.—

Glabrous trees or shrubs; leaves alternate petiolate; stipules minute, tuberculiform or glanduliform, sometimes developed into indurated recurved prickles; flowers in compound much ramified racemes terminal or axillary; bracts 1-flowered; bractlets 2, lateral (*Tropical America*). See p. 37.

14. **Adenogramma** REICHB.—Flowers hermaphrodite, apetalous; sepals 5, imbricate. Stamens 5; filaments free or connate at base in short cupule; anthers introrse, 2-rimose. Ovary oblique, conical, 1-celled; style slender, apex capitellate stigmatiferous; ovule 1, campylotropous, inserted at the summit of a slender subbasilar erect funicle. Fruit dry, obliquely conical; pericarp smooth or granulate, usually coriaceous, blackish, indehiscent or longitudinally dehiscent. Seed straight or curved; testa membranous; embryo arched or uncinate, encircling a fleshy albumen.—Diffuse herbs; branches slender sub-2-chotomous; leaves in false verticils simple, usually narrow; stipules small or very small; flowers small in umbelliferous axillary and terminal cymes (*South Africa*). See p. 38.

V.? THELYGONEÆ.

15. **Thelygonum** L.—Flowers monœcious. Male calyx 2-phyllous, valvate; leaves finally revolute. Stamens ∞, inserted on short receptacle; filaments capillary, finally cernuous; anthers linear, 2-celled, introrse, 2-rimose, versatile. Female calyx at the apex finally eccentric, tubular; apex 3-dentate; base laterally increased and gibbous. Ovary eccentric, subglobose; ovule 1, subbasilar, campylotropous; style lateral, subbasilar (gynobasic), erect in tube of perianth, apex clavate, stigmatiferous. Fruit drupaceous; mesocarp thin; seeds suberect, hippocrepiform; embryo uncinate, encircled within and without by a fleshy albumen; radicle cylindro-conical, inferior; cotyledons narrow, incumbent.—An annual subsucculent herb; leaves alternate; inferior ones opposite, simple and penninerved; petiole dilated at the base into a stipuliform incised sheath; flowers in axillary glomerules; males ebracteate 1–∞; females often 3-nates, or ∞, pluribracteolate (*Mediterranean region*). See p. 39.

VI. GYROSTEMONEÆ.

16. **Gyrostemon** Desf.—Flowers dicœcious. Male calyx small, unequal 4–8-dentate; teeth imbricate, finally not contiguous. Stamens 6–∞, 1- or ∞-verticillate; anthers subsessile, cuneiform, all inserted on the convex receptacle or round processus of central column, 2-celled, lateral 2-rimose; connective produced beyond, cells, short and obtuse. Female calyx as in male flower. Carpels 4–∞, verticillate round more or less long conical receptacle. Germens 1-ovulate, produced in styles more or less incurved or reflexed at apex, inwardly stigmatiferous; ovule subbasilar, ascending; micropyle extrorse, inferior. Fruit subglobose or obconical (*Codonocarpus*), in follicles 4–∞, constant, finally separating from columella (of variable form, furnished with 4–∞ persistent apices of style), and among themselves, dehiscing either dorsally and longitudinally (*Gyrostemon*) or by ventral clefts (*Codonocarpus*). Seed ovate, pseudo-campylotropous, hippocrepiform, alternately ascending more or less from the internal angle of the carpels; testa transverse rugose, arillate at micropyle and hilum; embryo hippocrepiform; cotyledons narrow, incumbent; radicle inferior, extrorse; albumen thin, or more or less copiously farinaceous.—Ramified shrubs (or herbs?) glabrous; leaves alternate sessile articulate; stipules small, lateral; limb linear-subulate, or membranous-subcarneous; flowers reduced to leaves sometimes (*Codonocarpus*) to bracts, axillary, solitary, pedunculate (*Australia*). See p. 41.

17? **Tersonia** Moq.—Flowers nearly of *Gyrostemon;* males 8–∞-androus; stamens round the base of processus of central receptacle 1-seriate. Carpels ∞ (15–30) in the fruit depresso-globose, ligneous, transverse, rugose, connate, indehiscent; seeds and other characters of *Gyrostemon*.—Shrubs; leaves linear; flowers axillary, subsessile (*Australia*). See p. 43.

18. **Didymotheca** Hook. f.—Flowers dicœcious, 4-merous. Calyx short; 2 lateral lobes longer and narrower. Stamens 8, 9; anthers subsessile, erect, obpyramidal; cells 2, lateral marginally rimose. Germen free; carpels 2, lateral 2-dymous, compressed; style 2,

elongated, thick, divergent; internally stigmatiferous; ovule solitary in each cell, ascending, incompletely anatropous; micropyle exterior inferior, thick. Fruit 2-dymous, 2-capsular, furnished at base with dry calyx; carpels crowned with more or less persisting column of central style, separating, dorsally and longitudinally dehiscent. Seeds rugose-striate, base furnished with thick aril; embryo arcuate peripheral encircling a subcarneous albumen; radicle inferior.— Erect, much ramified undershrubs; branches close, slender; leaves alternate, simple, narrow; stipules very small, glanduliform; flowers solitary, with very short pedicels, in axils of upper leaves of branch, or of 2-stipulate bracts (*Australia, Tasmania*). See p. 43.

XXVI. MALVACEÆ.

I. STERCULIA SERIES.

Sterculia[1] (figs. 78–87) is immediately distinguished in this group by its independent carpels—a character not having here all the importance that would at first appear, but which however has

Sterculia carthagenensis.

FIG. 78.
Floriferous branch ($\frac{1}{3}$).

caused most botanists to make it the type of a particular family. It has regular apetalous polygamous flowers. In those which are

[1] L., *Gen.*, n. 1086.—ADANS., *Fam. des Pl.*, ii. 357.—J., *Gen.*, 278.—LAMK., *Dict.*, vii. 428; Suppl., v. 246: *Ill.*, t. 736.—TURP., in *Dict. Sc. Nat., Atl.*, t. 142, 143.—CAV., *Diss.*, v. 284.

hermaphrodite we may observe a gamosepalous calyx, often coloured, of variable form,[1] more or less deeply cut into five[2] divisions,

Sterculia Balanghas.

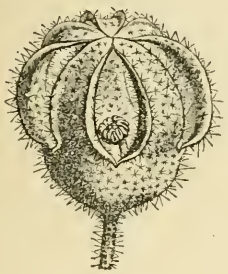

FIG. 79.
Male flower ($\frac{3}{1}$).

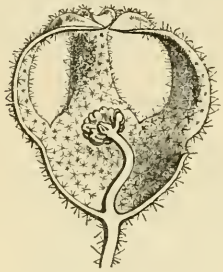

FIG. 80.
Long. sect. of male flower.

FIG. 81.
Sexual organs of male flower ($\frac{8}{1}$).

FIG. 84.
Female flower,
long. sect. of sexual organs.

FIG. 83.
Female flower,
sexual organs ($\frac{8}{1}$).

FIG. 82.
Male flower,
long. sect. of sexual organs.

valvate and of very diverse forms.[3] From the bottom of this perianth, smooth or thickened into a glandular disk, rises a column

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—DC., *Prodr.*, i. 481.—ENDL. et SCHOTT, *Meletem.* (1832), 32-34.—R. BR., in *Benn. Pl. Jav. Rar.*, 226.—ENDL., *Gen.*, n. 5320 (part.).—B. H., *Gen.*, 217, n. 1.—SCHNIZL., *Iconogr.*, t. 210.—LEM. et DCNE., *Tr. Gén.*, 344.—HOOK. and MAST., *Fl. of B. Ind.*, 354.—H. BN., in *Adansonia*, x. 161 (incl. : *Astrodendron* DENNST., *Balanghas* BURM., *Brachychiton* SCHOTT, *Carpopyllum* MIQ., *Cavalam* RUMPH., *Cavallium* SCHOTT, *Chichæa* PRESL, *Clompanus* RUMPH., *Delabechea* LINDL., *Erythropsis* LINDL., *Firmiana* MARSIGL., *Hildegardia* SCHOTT, *Ivira* AUBL., *Mateatia* VELLOZ., *Pœcilodermis* SCHOTT, *Pterocymbium* R. BR., *Pterygota* SCHOTT, *Scaphium* SCHOTT, *Southwellia* SALISB., *Theodoria* NECK., *Trichosiphon* SCHOTT, *Triphaca* LOUR).

[1] Obovoid, campanulate, obconical or subinfundibuliform, sometimes hemispherical at the base, with five divisions, forming in its upper part a hemispherical, conical, or pyramidal cap.

[2] Rarely four or six.

[3] When they are narrow, pointed, a little reduplicate, sometimes it happens that they separate from each other below. At the same time that their edges are reflexed, without quitting each other, at the much tapering summits. They form thus a sort of conical cage, across which the interior of the flower may be seen.

varying much in thickness and length[1] in the different species, or even in the same species, according to the sex, and which bears in its upper part ten anthers or more, extrorse, two-celled, dehiscing by two longitudinal clefts and arranged without any apparent order at maturity.[2] Above these anthers is found the gynæceum, formed of five carpels superposed to the divisions of the perianth. The ovaries are independent of each other, one-celled with a parietal placenta situated in the internal angle. But the styles and their stigmatiferous apex of variable form adhere to each other for a certain distance to separate at a certain age.[3] Each placenta bears sometimes two ascending anatropous ovules with micropyle exterior and inferior, or more generally two ranks of ovules, more or less ascending,[4] or subhorizontal. Certain flowers are male (figs. 79–83) or female (figs. 84, 85) according as the carpels or the stamens are arrested sooner or later in their evolution. The fruit (fig. 85) is formed of five patulous follicles, radiating in a verticil of variable consistence opening at a more or less advanced period, mono- or polyspermous; and the organization of the seeds which they enclose presents very great differences according to the species. It is by the aid of these characters that *Sterculia* has been grouped into fifty sections or subgenera,[5] which are found in all the warm regions of the globe.

Most generally the seed is suborthotropous, or at least very incompletely anatropous; so that the embryo has the summit of the cotyledons turned towards the hilum, while it is consequently oblique or transverse to the plane of the umbilicus. It is moreover surrounded by a fleshy albumen which adheres more or less to the dorsal side of the cotyledons,[6] and to the seminal coats.[7] This is

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[1] When this column is slender and very long, it is often bent in the bud (figs. 80–82).

[2] A generic value has been given to this want of regularity in the arrangement of the androceum at maturity. But earlier the stamens have a particular order of arrangement, as we have described (in *Adansonia*, x. 162). The pollen, ovoidal, with three folds, when in water, becomes spherical, with three papillose bands (H. Mohl., in *Ann. Sc. Nat.*, sér. 2, iii. 334).

[3] We may suppose, then, that there is but one capitate style, the ovaries remaining free.

[4] In this case the micropyle looks downwards and outwards. The coat is double.

[5] See Schott, *Meletem., loc. cit.* The greater part of the sections have been considered as distinct genera in this work.

[6] The embryo occupies by its cotyledons all the extent of the seminal cavity (and often even more), which obliges it to bend in a transverse section the albumen, and appears separated into two parts, which resemble thick cotyledons.

[7] As many as four layers may here be distinguished; a fleshy mucilaginous epidermis, a thin membrane surrounding the albumen, and between them a plate often double, thick coloured, and generally testaceous within.

what occurs in *Eusterculia*,[1] a species of the tropical regions of Asia, Africa, and America. In *Firmiania*,[2] of which three or four species belong to the old Continent, the seed is the same, with an embryo more or less oblique (figs. 86, 87); but the carpels are open and patulous even before maturity, so that they look like leaves, upon the edges of which a small number of seeds are inserted (fig. 85). The same phenomenon is produced in *Scaphium*,[3] consisting of Indian and Javanese species whose seeds, often solitary on each patulous carpel, occupy the more or less concave lower part. But the seed is completely anatropous; so that the embryo turns its radicle to the side of the hilum. It has the same direction in the *Brachychitons*[4] Australian species, whose organization is like that of *Eusterculia*, but in which the seeds are adherent to the bottom of the endocarp. Finally in *S. alata*,[5] an Indian species of which the genus *Pterygota*[6] has been made, the flowers and fruit are those of *Eusterculia*; but the anatropous seeds are surmounted by a narrow wing giving

Sterculia (*Firmiana*) *platanifolia*.

Fig. 85.
Fruit ($\frac{1}{2}$).

Fig. 86.
Seed ($\frac{3}{1}$).

Fig. 87.
Longitudinal section of seed.

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[1] Schott et Endl., *Meletem.*, 32.—*Clompanus* Rumph., *Herb. Amboin.*, iii. t. 107.—*Cavalam* Rumph., *op. cit.*, i. t. 49.—*Balanghas* Burm., *Fl. Zeyl.*, 84.—*Astrodendron* Dennst., *Hort. Malab.*, iv. 62.—*Theodoria* Nec., *Elem.*, n. 1048.—*Triphaca* Lour., *Fl. Cochinch.*, 708.—*Ivira* Aubl., *Guian.*, ii. 694, t. 279.—*Southwellia* Salisb., *Par. Lond.*, t. 69.—*Chichæa* Presl, *Rel. Hænk.*, ii. 140.—*Mateatia* Velloz., *Fl. Flum.*, ix. t. 95.

[2] Marsigl., ex Schott, *Melet.*, 33.—R. Br., in *Ben. Pl. Jav. Rar.*, 235.—*Erythropsis* Lindl., in *Bot. Reg.*, sub n. 1236.—? *Carpophyllum* Miq., *Fl. Ind.-Bat.*, Suppl., i. 401.

[3] Schott, *loc. cit.*, 33.—*Pterocymbium* R. Br., *loc. cit.*, 219, t. 45. The number of stamens may decline to eight or ten.

[4] Schott, *loc. cit.*, 34.—R. Br., *loc. cit.*, 234.—*Pœcilodermis* Schott, *loc. cit.*, 33.—*Trichosiphon* Schott, *loc. cit.*, 34.—*Delabechea* Lindl., in *Mitch. Trop. Austral.*, 155. The *Hildegardia* (Schott, *Melet.*, 33), genus proposed for the *S. populifolia* Wall. (*Pl. As. Rar.*, i. t. 3), because the carpels are said to be winged (while they become only more or less thin above towards the edges), may be connected with this section, if, as we are assured, the seeds are anatropous; if not, they can be connected with *Eusterculia*.

[5] Roxb., *Pl. Coromand.*, iii. 84, t. 287.

[6] Schott et Endl., *Melet.*, 32.—Endl., *Gen.*, n. 5321.

them the appearance of a samara. Thus defined[1] the genus *Sterculia* is composed of trees,[2] often stately, with alternate petiolate leaves accompanied by lateral stipules, simple, lobed, or digitate. The flowers are disposed in racemes, often axillary, with a simple or more frequently a ramified axis, and bearing small cymes, the terminal flowers being frequently female, the others male, and all having generally an articulate pedicel.

Tarrietia[3] has flowers nearly similar to those of *Sterculia*. Their anthers placed upon a short stem are similarly arranged. But each of their three or five carpels only encloses in its ovary a single ascending anatropous ovule, with inferior and exterior micropyle; and the fruits are dry, indehiscent and surmounted by an elongated wing. Two or three species of this genus are enumerated. One is an Australian tree[4] with digitate trifoliate leaves covered with squamose hairs. The others are Javanese,[5] glabrous with 3–5-foliate leaves. All have numerous small polygamous flowers arranged in much ramified racemes of cymes, axillary or lateral.

The two genera *Cola* and *Heritiera* are very nearly connected with *Sterculia*, and perhaps cannot be generically separated from it. They both have seeds destitute of albumen. In *Cola*[6] the anthers[7] remain regularly arranged in a circle towards the apex of the general column instead of being displaced to different heights as in *Sterculia*. Half a dozen species[8] of *Cola* are known, all natives of tropical

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[1] Sterculia sect. 5.
1. *Eusterculia.*
2. *Firmiana.*
3. *Scaphium.*
4. *Brachychiton.*
5. *Pterygota.*

[2] Cav., *Diss.*, t. 141–145.—H. B. K., *Nov. Gen. et Spec.*, v. 299.—A. S. H., *Pl. Us. Bras.*, t. 46.—Roxb., *Pl. Corom.*, t. 24, 25.—Wall., *Pl. As. Rar.*, i. t. 3, 59; ii. t. 127; iii. t. 262.—Wight, *Ill.*, t. 30; *Icon.*, t. 181, 364, 487.—Guill. et Perr., *Fl. Sen. Tent.*, i. 79, t. 16.—A. Gray, in *Amer. Expl. Exped.*, i. 185, t. 13 (*Firmiana*).—Miq., *Fl. Ind.-Bat.*, i. p. ii. 177; Suppl., i. 399.—Harv., *Thes. Cap.*, t. 3.—Anders., in *Journ. Linn. Soc.*, v. Suppl., t. 2.—F. Muell., *Pl. Vict.*, t. Suppl. 5.—Miq., *Fl. Ind.-Bat.*, i. 172.—Benth., *Fl. Austral.*, i. 225.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 215.—H. Bn., in *Adansonia*, x. 179.—*Bot. Reg.*, t. 1256, 1353.—Walp., *Rep.*, v. 97, 103; *Ann.*, ii. 159, 160; vii. 419.

[3] Bl., *Bijdr.*, 227; in *Rumphia*, iii. t. 172, fig. 1.—Endl., *Gen.*, n. 5638.—B. H., *Gen.*, 218, n. 2.—*Argyrodendron* F. Muell., *Fragm.*, i. 2; ii. 177.

[4] *T. Argyrodendron* Benth., *Fl. Austral.*, i. 230.—Walp., *Ann.*, vii. 421.—*Argyrodendron trifoliolatum* F. Muell., *loc. cit.*

[5] Miq., *Fl. Ind.-Bat.*, i. p. ii. 179; Suppl., i. 401.

[6] Bauh., *Pin.*, 507.—Schott et Endl., *Melet.*, 33.—R. Br., in *Benn. Pl. Jav. Rar.*, 236.—B. H., *Gen.*, 218, n. 3.—*Courtenia* R. Br., *loc. cit.*—*Bichy* Lunan, *Jam.*, i. 86. — ? *Culhamia* Forsk., *Fl. Æg.-Arab.*, 96 (ex Endl., *Gen.*, 994, f.).—*Lunanea* DC., *Prodr.*, ii. 92.—*Edwardia* Rafin., *Spect.*, i. 158.—*Siphoniopsis* Karst., *Pl. Columb.*, 139, t. 69.

[7] With parallel or superposed cells.

[8] Guillem. et Perr., *Fl. Sen. Tent.*, i. 81, t. 15 (*Sterculia*).—Mast., in *Oliv. Fl. Trop. Afr.*, i. 220.—H. Bn., in *Adansonia*, x. 165.—Walp., *Rep.*, v. 106; *Ann.*, vii. 421.

Africa: their vegetative organs are those of *Sterculia*. It is the same with *Heritiera*[1] (figs. 88–94) whose leaves are undivided. The

Heritiera littoralis.

FIG. 89.
Male flower ($\frac{4}{1}$).

FIG. 90.
Long. section of male flower.

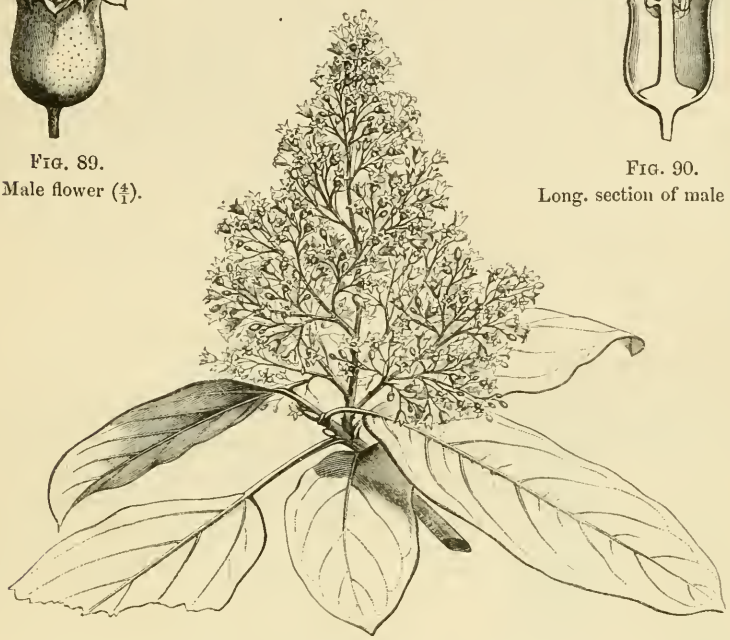

FIG. 88.
Floriferous branch ($\frac{1}{2}$).

FIG. 91.
Male flower, without perianth ($\frac{6}{1}$).

FIG. 92.
Female flower ($\frac{2}{1}$).

FIG. 93.
Longitudinal section of female flower.

FIG. 94.
Female flower, without perianth ($\frac{4}{1}$).

[1] AIT., *Hort. Kew.*, ed. 1, iii. 546.—DC., *Prodr.*, i. 484.—SCHOTT et ENDL., *Melet.*, 32.—ENDL., *Gen.*, n. 5119.—B. H., *Gen.*, 219, n. 4.—H. BN., in *Adansonia*, x. 164.—*Balanopteris* GÆRTN., *Fruct.*, ii. 94, t. 98, 99.—*Sutherlandia* GMEL., *Syst.*, 1027 (nec. R. BR.).—*Samandura* L., *Fl. Zeyl.*, 433.—*Atunus* RUMPH., *Herb. Amboin.*, iii. t, 63 (ex ENDL., *loc. cit.*).

anthers, few in number,[1] also form a ring upon the common support. The carpels are uni- or rarely bi-ovulate,[2] and their indehiscent fruit is a woody, suberous achene longitudinally carinated upon the back. Two species of *Heritiera*[3] are admitted, inhabiting the warm regions of Asia and Australia, and most of the Oriental islands off the coast of tropical Africa.[4]

Tetradia Horsfieldii,[5] a tree but little known, a native of Java, has simple leaves, and polygamous flowers very similar to those of *Heritiera*. The androceum is formed of a variable[6] number of stamens circularly united on the top of a central column, and the gynæceum is said to be formed of four multiovulate carpels; but the perianth consists of three or four leaves, free or nearly so, and valvate. The flowers are axillary subsessile, or united in short racemes.[7]

II. HELICTERES SERIES.

Helicteres[8] (figs. 95, 96) has hermaphrodite flowers. On the convex receptacle is seen first a gamosepalous calyx, with five more or less

[1] There are often only five or six, but sometimes a larger number; whatever may be the number, the cells are parallel, as in the anthers of *Cola*, and the lines of dehiscence vertical.

[2] The ovules are ascendant with micropyle turned downwards and outwards.

[3] HAM., in *Sym. Emb. Ava.*, t. 28.—WIGHT et ARN., *Prodr.*, i. 63.—WALP., *Rep.*, v. 106; *Ann.*, iv. 321; vii. 421.

[4] It is only with hesitation that we can place here a plant of Angola, which is quite unknown to us and which the authors of *The Flora of Tropical Africa* (i. 219): *Octolobus spectabilis*, WELW., *Sert. Angol.*, 17, t. 6 (ex *Trans. Linn. Soc.*, xxvii.), have not been able to see. It appears allied at the same time to *Sterculiaceæ* and to *Anonaceæ*, which however, it does not resemble in its seed. Its characteristics are, according to BENTHAM & J. HOOKER, who (*Gen.*, 982, n. 2 *a*) place it near *Tarrietia*:—"Flores 1-sexuales. Calycis campanulati tubus subcylindraceus; lobi 8, coriacei, marginibus late membranaceis induplicatis corrugatis. Petula 0. Staminum columna brevis cylindrica, stipiti elongato conico tomentoso imposita; antheræ perplurimæ, in discum orbicularem vertice depressum connatæ. Ovarii carpella perplurima, ∞-seriata, in capitulum globosum gynophoro brevi impositum conferta, verticillo staminodiorum cincta, libera, anguste ovoidea, dense tomentosa, 1-locularia; stylus 0, stigmate sessili 2-lobo; ovula ∞, 2-seriata. Carpella matura 8–12, distincta, stipitata, turgide obovoidea gibba, rostro recurvo terminata, sub-2-sperma. Semina subglobosa, sessilia; hilo orbiculato; testa membranacea; albumine 0. Embryo subglobosus, cotyledonibus crassissimis, radicula brevissima, plumula pilosa. — Arbor patentim comosa, ramulis robustis. Folia alterna, longe petiolata; petiolo apice incrassato; obovato-lanceolata, obtuse acuminata, coriacea, glaberrima. Stipulæ geminæ laterales erectæ acutissimæ. Flores magni, in ramulis sessiles, solitarii fulvo-villosi."

[5] R. BR., in *Benn. Pl. Jav. Rar.*, 233.—B. H., *Gen.*, 219, n. 5.—WALP., *Rep.*, v. 103.

[6] The androceum has been described since R. BROWN, as formed of four stamens. Upon two flowers, which we have examined, we have certainly seen fourteen or sixteen anther-cells, linear and vertical.

[7] "Gen. *Sterculiæ* et *Colæ* affin., fruct. adhuc ignot. incert." (B. H., *loc. cit.*)

[8] L., *Gen.*, n. 1025.—J., *Gen.*, 278.—GÆRTN., *Fruct.*, i. 308, t. 64.—LAMK., *Dict.*, iii. 86; Suppl., iii. 19; *Ill.*, t. 735.—DC., *Prodr.*, i. 475.—SCHOTT et ENDL., *Melet.*, 31.—ENDL., *Gen.*, n. 5316.—B. H., *Gen.*, 220, n. 10.—H. BN., in *Payer Fam. Nat.*, 284 (incl.: *Alicteres* NECK., *Isora* SCHOTT, *Methorium* SCHOTT, *Orthothecium* SCHOTT, *Oudemansia* MIQ.).—HOOK. & MAST., *Fl. of B. Ind.*, 365.

deep divisions, valvate and sometimes unequal. Higher up are inserted five free petals, contorted with elongated claws, naked or provided on each side with a kind of auriculate appendage, and forming a corolla analogous to that of the Mallows. Above, the receptacle is prolonged, as in *Sterculia*, into a long column, at the summit of which the gynæceum is found, and immediately below it the androceum, whose composition is variable. It comprehends either ten stamens superposed, five to the divisions of the calyx, and five to the petals, each provided with a two-celled extrorse anther with longitudinal dehiscence, and five sterile tongues (staminodes ?) and five fertile stamens; or five groups of two or three fertile stamens, each alternating with these tongues. The gynæceum is composed of five alternipetalous carpels, whose one-celled ovary tapers into a style, with more or less thickened and stigmatiferous apex. In the mature flower it frequently happens that the styles for a variable distance, and the ovaries in the upper part of their interior angle, adhere more or less closely to each other; but the carpels separate again one from another at maturity. They are then dry, polyspermous, dehiscing by the length of their internal angle, and the seeds contain under their coats a not very abundant albumen, surrounding an embryo with foliaceous cotyledons folded and convolved round the radicle which is near the hilum. Species of *Helicteres* are found in all the warm parts of the globe, particularly of the New World. Among the thirty species[1] or so which compose the genus, nearly half of them have carpels remaining straight. A section has been made of them, called *Orthocarpæa*.[2] The others

Helicteres Isora.

FIG. 96. Fruit.

FIG. 95. Flower.

[1] H. B. K., *Nov. Gen. et Spec.*, v. 303.—A. S. H., *Pl. Us. Brasil.*, t. 64; *Fl. Bras. Mer.*, i. 271, t. 54.—MORIC., *Pl. Nouv. Amér.*, t. 63.—WIGHT, *Icon.*, t. 180.—A. RICH., *Fl. Cub.*, t. 18, 19.—THW., *Enum. Pl. Zeyl.*, 28.—MIQ., *Fl. Ind.-Bat.*, i. p. ii. 169.—BENTH., *Fl. Austral.*, i. 232.—GRISEB., *Fl. Brit. W.-Ind.*, 89.—*Bot. Reg.*, t. 903.—*Bot. Mag.*, t. 2061.—WALP., *Rep.*, i. 332; ii. 794; *Ann.*, i. 105; ii. 159; iv. 319; vii. 422.

[2] DC., *Prodr.*, 476 (sect. ii.).—*Alicteris* NECK., *Elem.*, n. 1801.—*Orthothecium* SCHOTT et ENDL., *Melet.*, 31.—*Methorium* SCHOTT et ENDL., *loc. cit.*, 29, t. 5.—ENDL., *Gen.*, n. 5315.—*Oudemansia* MIQ., *Pl. Jungh.*, i. 296; *Fl. Ind.-Bat.*, i. p. ii. 169.

have the mass of carpels spirally twisted (fig. 96), whence the name *Spirocarpæa*.[1] They are trees or shrubs, generally covered in all parts by stellate or ramose hairs. The leaves are alternate, and the axillary flowers are solitary or disposed in small cymes; the pedicels are often furnished with two stipuliform bracts.

By the side of this genus are placed the five following:—

Kleinhovia,[2] of which we only know one Asiatic[3] species, has the same androceum as *Helicteres*, supported by a long column, at the apex of which the gynæceum is planted; but this has an ovary with five pluriovulate cells, and the fruit is a membranous vesiculate loculicidal capsule.

Pterospermum (fig. 97)[4] has a much shorter stem, supporting the gynæceum and androceum; the former has also a quinquelocular ovary. As to the stamens, they have elongated monadelphous, or unequally polyadelphous filaments, and cells also elongated. A dozen species of this genus are known,[5] being trees or shrubs of tropical Asia, with leaves frequently unsymmetrical, and axillary flowers solitary or few. The fruit is a loculicidal coriaceous or woody capsule, with winged seeds.

Pterospermum suberosum.

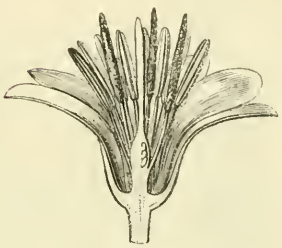

FIG. 97.
Longitudinal section of flower.

In *Eriolæna*,[6] of which the type of a particular tribe[7] has been made, the common support of the androceum and gynæceum is much shorter, some-

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[1] DC., *Prodr.*, 475 (sect. i.).—*Isora* SCHOTT et ENDL., *loc. cit.*, 31.

[2] L., *Gen.*, n. 1024.—GÆRTN., *Fruct.*, ii. 261, t. 137.—LAMK., *Dict.*, iii. 367; *Ill.*, t. 734.—DC., *Prodr.*, i. 488.—ENDL., *Gen.*, n. 5335.—B. H., *Gen.*, 219, n. 9.

[3] *K. Hospita* L., *Spec.*, 1365.—RUMPH., *Herb. Amboin.*, iii. t. 113.—CAV., *Diss.*, t. 146.—H. B. K., *Nov. Gen. et Spec.*, v. 313.—ROXB., *Fl. Ind.*, iii. 140.—WIGHT et ARN., *Prodr.*, i. 64.—GARCKE, in *Bonplandia*, v. 258.—WALP., *Ann.*, vii. 422.

[4] SCHREB., *Gen.*, 461.—DC., *Prodr.*, i. 500.—ENDL., *Gen.*, n. 5352.—B. H., *Gen.*, 220, n. 11.—H. BN., in *Payer Fam. Nat.*, 285.—*Velaga* ADANS., *Fam. des Pl.*, ii. 389.—GÆRTN., *Fruct.*, n. 245, t. 133.—*Pterolæna* DC., *Prodr.* (sect. ii.).—*Sezegleewia* TURCZ., in *Bull. Mosc.* (1858), i. 233.

[5] L., *Spec.*, 939 (*Pentapetes*).—CAV., *Diss.*, iii. t. 43, 44.—ROXB., *Cat. Hort. Calc.*, 50.—DC., in *Mém. Mus.*, x. 111, t. 9.—WIGHT, *Icon.*, t. 489, 631.—HOOK., *Icon.*, t. 125.—THW., *Enum. Pl. Zeyl.*, 30.—BENTH., *Fl. Hongk.*, 38.—MIQ., *Fl. Ind.-Bat.*, Suppl., i. 403.—*Bot. Mag.*, t. 620, 1526.—WALP., *Ann.*, ii. 168; vii. 422.

[6] DC., in *Mém. Mus.*, x. 102, t. 5; *Prodr.*, i. 501.—ENDL., *Gen.*, n. 5354.—B. H., *Gen.*, 220, n. 12.—H. BN., in *Payer Fam. Nat.*, 287.—*Wallichia* DC., in *Mém. Mus.*, x. 104, t. 6.—*Microlæna* WALL., *Cat.*, n. 1173.—ENDL., *Gen.*, n. 5355.—*Jackia* SPRENG., *Syst.*, iii. 85.—*Schillera* REICHB., *Consp.*, 204.

[7] *Eriolæneæ* ARN., *Prodr.*, i. 70.—ENDL., *Gen.*, 1003.—B. H., *Gen.*, 220.

times almost wholly absent; and the stamens, nearly the same in form as those of *Pterospermum*, are echeloned upon the exterior of the common tube formed by the non-free portion of the filaments. The ovary is divided into from four to twelve pluriovulate cells, and the fruit is a woody, loculicidal, polyspermous capsule, with winged seeds. The six or seven known species[1] are Indian trees, with axillary flowers, solitary or grouped in cymes.

In the two genera *Ungeria* and *Reevesia* the general organization is very analogous to that of *Kleinhovia* and *Pterospermum*, but the anthers are inserted, as in *Sterculia*, directly under the gynæceum, borne at the summit of the general column. In *Reevesia*[2] each of the ovary cells contains two ascending ovules, with inferior and exterior micropyle; and the capsular, woody, loculicidal fruit contains as many as ten winged, albuminous seeds. It consists of trees of tropical and subtropical Asia, with flowers arranged in terminal racemose cymes: a couple of species of them are enumerated.[3] In *Ungeria*,[4] of which there is but one species,[5] a native of Norfolk Island; the fruit is a woody capsule, with five prominent angles, like thick narrow longitudinal wings; and the non-winged seeds are solitary in each cell, this being uniovulate in the flower.

III. DOMBEYA SERIES.

The flowers of *Dombeya*[6] (figs. 98–101) are regular, hermaphrodite, and generally pentamerous. Their calyx is valvate,[7] and their corolla formed of contorted,[8] often unsymmetrical[9] petals. The androceum is

[1] Wall., *Pl. As. Rar.*, i. t. 64.—Wight, *Icon.*, t. 882 (*Microchlæna*).—Walp., *Rep.*, i. 351.

[2] Lindl., in *Quart. Journ.* (1827), iii. 109; in *Bot. Reg.*, t. 1236.—Schott et Endl., *Melet.*, 31.—Endl., *Gen.*, n. 5318.—B. H. *Gen.*, 219, n. 7.

[3] Hook., in *Bot. Mag.*, t. 4199.—Walp., *Rep.*, i. 334.

[4] Schott et Endl., *Melet.*, 27, t. 4.—Endl., *Gen.*, n. 5317.—B. H., *Gen.*, 219, n. 8.

[5] *U. floribunda* Schott et Endl., *loc. cit.*

[6] Cav., *Diss.*, iii. 121, t. 38–41.—J., *Gen.*, 277.—Gærtn., *Fruct.*, ii. 259, t. 137.—Lamk., *Ill.*, t. 137.—DC., *Prodr.*, i. 498.—Spach, *Suit. à Buffon*, iii. 447.—Endl., *Gen.*, n. 5346.—B. H., *Gen.*, 221, 983, n. 15.—H. Bn., in *Payer Fam. Nat.*, 288.—*Assonia* Cav., *Diss.*, 120, t. 42.—DC., *Prodr.*, i. 498.—Endl., *Gen.*, n. 5345.—*Vahlia* Dahl, *Obs.*, 40 (nec Thunb.).—*Kœnigia* Commers., mss.—*Xeropetalum* Del., *Cent. Pl. Caill.*, 84.—Endl., *Gen.*, n. 5347.—*Astrapæa* Lindl., *Collect.*, t. 14; *Bot. Reg.*, t. 691.—Endl., *Gen.*, n. 5349.—H. Bn., in *Adansonia*, ii. 173.—*Hilsenbergia* Boj., in *Ann. Sc. Nat.*, sér. 2, xviii. 189.

[7] The sepals, glabrous, or bearing stellate hairs outside, are often reflexed at anthesis.

[8] Often persistent and becoming round the fruit, dry and stiff as parchment.

[9] Such is their number in *D. decanthera* Cav., *Diss.*, iii. 126, t. 40, fig. 2;—(*Melhania decanthera* DC., *Prodr.*, i. 499, n. 1), which appears

composed of five bundles of fertile stamens superposed to the sepals and five staminodes in the form of oppositipetalous petaloid tongues. All these elements are generally united below for a variable distance into a monadelphous urceolate tube. The bundles of fertile stamens are occasionally formed of two, but more frequently of three, or four, rarely of five, or a greater number of unequal branches,[1] each bearing a two-celled extrorse anther, dehiscing by two longitudinal clefts. The

Dombeya angulata.

Fig. 99.
Flower.

Fig. 98.
Inflorescence.

Fig. 100.
Longitudinal section of flower ($\frac{2}{1}$).

gynæceum is free, formed of an ovary with five alternipetalous cells, and more rarely of a smaller number of cells, surmounted by a style more or less deeply divided into a similar number of branches stigmatiferous above and within. In the internal angle of each cell is found a placenta supporting two collateral or almost superposed and ascending ovules (fig. 100), with micropyle looking downwards and outwards. The fruit is a loculicidal capsule, formed of from two to five mono- or di-spermous cells; and the seeds contain under their coats a fleshy albumen enveloping an embryo more or less folded upon itself, with inferior radicle, and large foliaceous bipartite cotyledons. *Dombeya* consists of shrubs or bushes of the warmest regions of

Dombeya (*Assonia*) *populnea.*

Fig. 101.
Fruit ($\frac{2}{1}$).

moreover, inseparable from this genus, whose perianth it has. The two stamens of each pair are unequal, and have almost cordiform anthers. The ovary is two-celled, with one or two ovules in each cell.

[1] In *Astrapæa* there are often five fertile stamens, the most exterior being the shortest. The tube which they form is cylindrical or pentagonal. In *D. cannabina* (Hook., in *Bot. Mag.*, t. 3619), the type of the genus *Hilsenbergia*, the tube of the androceum is very long and very narrow. The pollen of *Dombeya* is, according to H. Mohl (in *Ann. Sc. Nat.*, sér. 2, iii. 334), formed of spherical grains covered with short spines, with three equatorial papillæ surrounded by a narrow halo.

insular and continental Africa, abounding particularly in the islands on the eastern[1] coast. The leaves are alternate, provided with stipules, and often cordate and palminerved. The flowers are in axillary or terminal cymes, pedunculate, often ramified, often also resembling umbels or capitula, and surrounded by several bracts like an involucre. Each pedicel is provided with two or three unilateral bractlets of very variable dimensions, free or connate, and often caducous. The genus includes about twenty-five species,[2] of which several described as distinct are very variable in form.

The genera collected in this series of *Dombeya* proper are very nearly related. They are, first, *Trochetia* (fig. 102), which have often multiovulate ovary cells, or which, when they have only two ovules in each cell, have below each of them an obturator, or rather the cells are divided into uniovulate demi-cells by a false partition; the calyx is coriaceous, the style formed of five thick radiating branches; the flowers generally few in number or even solitary, accompanied by very small bractlets, or without bractlets.

Trochetia Erythroxylon.

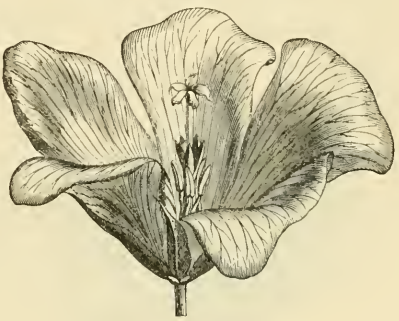

Fig. 102.
Flower.

The *Asterias* are species of *Dombeya* without petaloid staminodes, and with twenty fertile stamens. *Ruizia*, likewise, has no staminodes, but it has an ovary with ten biovulate cells and styles almost free. *Pentapetes* has pluriovulate ovary cells, a simple style, petaloid staminodes, and from ten to fifteen fertile stamens. *Cheirolæna* has most of the characters of *Pentapetes*, but its fertile stamens are detached a little below the exterior surface of the androceum tube, and the three bractlets which accompany the flower are digitate. Finally, *Melhania* consists of *Dombeyas* having not more than ten monadelphous stamens, five sterile and petaloid, superposed to the petals, and five fertile, and alternate.

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[1] Some species collected in India have perhaps been introduced here?

[2] Wall., *Pl. As. Rar.*, iii. t. 235.—Endl., *Iconogr.*, t. 118 (*Xeropetalum*).—Pl., in *Fl. des Serr.*, vi. 225, t. 605.—Harv. et Sond., *Fl. Cap.*, i. 220; Suppl., 590.—Harv., *Thes. Cap.*, t. 89, 137, 138.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 226.—*Bot. Mag.*, t. 2503 (*Astrapæa*), 2905, 4544, 4568, 4578, 5487.—Walp., *Rep.*, i. 349; ii. 797; *Ann.*, ii. 167; iv. 325; vii. 423.

IV. CHIRANTHODENDRON SERIES.

Chiranthodendron[1] (figs. 103–105) has regular hermaphrodite apetalous flowers. Upon the depressed receptacle is inserted a campanulate, coloured, thick, coriaceous perianth, whose divisions are united toward the base, and in the bud are ranged in quincuncial præfloration. At the foot of each is found a nectariferous dimple. More internally the receptacle bears the gynæceum, and around it enveloping it like a sheath the androceum is found, formed of five monadelphous stamens alternating with the divisions of the calyx.

Chiranthodendron platanoides.

FIG. 103.
Flower.

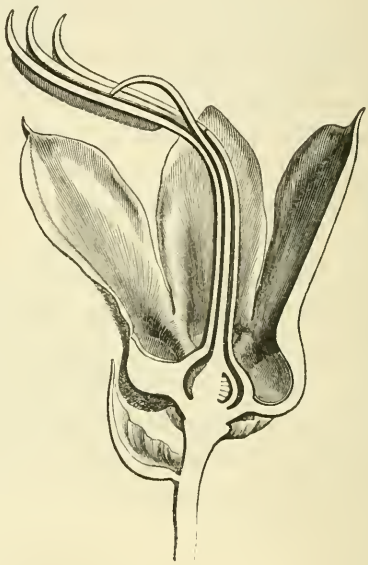

FIG. 105.
Longitudinal section of flower.

The filaments in the lower part form a long tube, conical on a level with the ovary which it envelops, then cylindrical a little higher up, and traversed by the style in its upper part. The summits of the

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[1] H., ex LARREATEGUI, *Descr. Bot. du* Chiranthodendron... (trad. LESCALL., 1805), icon.—*Cheirostemon* H. B., *Pl. Æquin.*, i. 81, t. 24.—H. B. K., *Nov. Gen. et Spec.*, v. 302.—TILES., in *Act. Petrop.*, v. 321, t. 9.—DC., *Prodr.*, i. 480.—SCHOTT et ENDL., *Melet.*, 34.—TURP., in *Dict. Sc. Nat.*, Atl., t. 139.—ENDL., *Gen.*, n. 5307.—PAYER, *Organog.*, 45.—B. H. *Gen.*, 212, n. 52, 983, n. 12 *a*.—H. BN., in *Payer Fam. Nat.*, 287.

filaments become free, and terminate by a basifixed connective pointed and fornicate at the apex; this surmounts the two cells of the anther which are appressed in their whole length on the external surface of a connective concave outwardly,[1] each opening by an extrorse longitudinal cleft. The staminal formation placed symmetrically round the gynæceum when young, subsequently grows out in such a way that the summit of the column formed by the filaments becomes oblique and the five anthers turn quite on one side, where they look like five fingers of a hand.[2] The ovary is superior; it is surmounted by a single style with a stigmatiferous apex tapering into a point, fornicate on the same side as the anthers, and projecting beyond the upper opening of the staminal tube.[3] In the ovary are five cells superposed to the divisions of the calyx with a multiovulate placenta in the internal angle of each. The ovules are arranged in two vertical series and are incompletely campylotropous.[4] The fruit is a loculicidal capsule with five valves, it encloses numerous seeds whose thick and crustaceous coats cover an axial embryo surrounded by a fleshy or almost corneous albumen. On the smooth glabrous exterior surface is developed a thick fleshy arillate projection, which grows from the coat between the base of the hilum and the region of the chalaza.

Chiranthodendron platanoides.

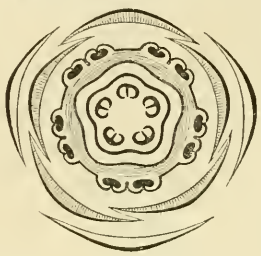

Fig. 104.
Diagram.

This genus for a long time only included a single species, *C. platanoides*,[5] a beautiful Mexican tree, with alternate cordate, 5–7-lobed leaves covered like almost all the other parts of the plant with a stellate down, and having almost oppositifolious flowers whose peduncles bear at variable heights two or three alternate bracts. But for some years a second species of the genus, *C. californicum*, has

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[1] The transverse section of the connective represents a V, with the horizontal section of an anther cell at the summit of each of its branches; the anthers have been supposed to be one-celled.

[2] Whence the vulgar name of *Arbol de manitas*.

[3] The convexity of the curve formed by the style, and by the staminal filaments formed into a tube looks towards the posterior side of the flower when it is mature and full blown.

[4] They have two coats.

[5] *Cheirostemon platanoides* H. B., *loc. cit.*—Hook., in *Bot. Mag.*, t. 5135.—*Belg. Hortic.*, x. t. 8.—Walp., *Rep.*, iv. 319; *Ann.*, vii. 418.—*Macpalxochitl* Hernand., *Mex.*, 382.

been described under the name of *Fremontia*.[1] It may be considered as the type of a special section because of its habit, and the more membranous and drier consistency of its calyx, and on account of its stamens, which preserve almost to the end their verticillate arrangement, and whose cells become much more fornicate and curved within;[2] and also because of its short subglobose capsule.

V. HERMANNIA SERIES.

The flower of *Hermannia*[3] (figs. 106–115) is regular and hermaphrodite. The convex receptacle bears a gamosepalous calyx with five not very deep divisions, valvate in the bud, then five alternate free petals with hollow claws like gutters, and the limb contorted in the bud. More internally are inserted five oppositipetalous stamens with filaments free or connate at the base, flattened, petaloid, often valvate reduplicate, and anthers narrower than the filaments, extrorse dehiscing from the top downwards to a variable distance by two longitudinal clefts.[4] The superior gynæceum is composed of a sessile stipitate ovary with five cells alternating with the stamens surmounted, by as many styles which unite by their edges to form a long conical hollow stigmatiferous apex. In the interior angle of each cell are inserted a certain number of anatropous, horizontal or oblique ovules. The fruit is a loculicidal capsule[5] (fig. 111), whose seeds,[6] indefinite in number, enclose under their coats a fleshy albumen more or less completely enveloped by the fornicate embryo (fig. 114). The *Hermannias* proper are about twenty-four in number. They are herbaceous suffrutescent, or frutescent plants, glabrous or more often covered

[1] Torr. in *Smiths. Contr.*, vi. 5, t. 2 (*Pl. Fremont.*).—B. H., *Gen.*, 212, n. 53, 982, n. 12 *a*.—*Bot. Mag.*, t. 5135.—Walp., *Ann.*, iv. 319; vii. 418.

[2] The wall of the anthers bears transversal parallel wrinkles. The tube formed by the base of the filaments is short and rather large.

[3] L., *Gen.*, n. 828.—J., *Gen.*, 289; in *Mém. Mus.*, v. 242.—Lamk., *Dict.*, iii. 177; Suppl., iii. 41; *Ill.*, t. 570.—Turp., in *Dict. Sc. Nat.*, Atl., t. 144.—DC., *Prodr.*, i. 493.—Endl., *Gen.*, n. 5340.—Payer, *Organog.*, 44, t. 9.—H. Bn., in *Adansonia*, iii. 176; ix. 338; in *Payer Fam. Nat.*, 289.—B. H., *Gen.*, 223, n. 20.—*Tricanthera* Ehrenb., in *Linnæa*, iv. 401.—Pl., in *Ann. Sc. Nat.*, sér. 4, iii. 292.—*Eurynema* Endl., *Gen.*, Suppl., ii. 292.

[4] Described as pores when they are at the apex, and very short. In all the *Hermannieæ* which have been studied (*Hermannia, Waltheria, Melochia*), the pollen is ovoidal or spherical, with three (rarely four) short folds, with umbilici (H. Mohl., in *Ann. Sc. Nat.*, sér. 2, iii. 334).

[5] With apex muticous, or prolonged into five points.

[6] They often have the rudiment of an aril (see *Adansonia*, ix. 338).

with hairs, frequently stellate. The leaves are alternate, dentate, or incised, accompanied by two large foliaceous stipules. Very rarely

Hermannia denudata.

FIG. 107.
Flower ($\frac{1}{2}$).

FIG. 106.
Floriferous branch.

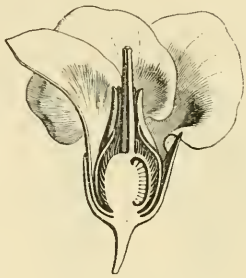

FIG. 109.
Longitudinal section of flower.

FIG. 108.
Diagram.

FIG. 110.
Flower without the perianth.

they are small or wholly absent. The flowers are in simple or compound cymes, sometimes resembling terminal or more often

Hermannia denudata.

FIG. 112.
Seed ($\frac{8}{1}$).

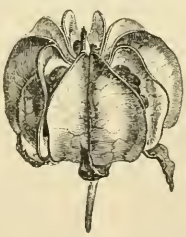

FIG. 111.
Fruit ($\frac{3}{1}$).

FIG. 113.
Longitudinal sect. of seed.

lateral and apparently axillary[1] racemes. Almost all the species are natives of South Africa; some however are met with in tropical Africa, in Madagascar, in Arabia, and three or four even in Mexico and Texas.[2]

In a great number of the *Hermannias* of South Africa the staminal filaments instead of enlarging in their upper part, present towards the middle of their height a dilatation which is sometimes covered with papillæ. It is upon this character that the genus *Mahernia*[3] (figs. 114, 115) has been founded, which is preserved by the greater number of authors. We only make it a section in the genus *Hermannia*, including in that alone thirty frutescent or suffrutescent[4] species.

Hermannia (*Mahernia*) *incisa*.

Fig. 114. Flower ($\frac{2}{1}$).

Fig. 115. Flower, without perianth.

In *Melochia*[5] (fig. 116) the general organization of the flower is the same as in *Hermannia*, but with two great differences: the carpels are superposed to the stamens instead of being alternate with them; and each of them instead of an indefinite number of ovules, only contains two, ascending, with exterior and inferior[6] micropyle. The styles moreover are free, at least to a certain distance; the staminodes of variable form may be interposed to the fertile stamens, with which they unite below; and the embryo is straight instead of being more or less curved. The calyx is sometimes membranous and vesicular round the fruit. It is for this reason that a special genus has been made under the name of *Physodium*,[7] containing two

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[1] They are often raised on the branches to a level with a leaf, by the side of which they become free. This arrangement is most apparent in *Melochia*. The flowers are, therefore, not really axillary.

[2] Cav., *Diss.*, vi. 327, t. 177–182.—Jacq., *Hort. Schœnbr.*, t. 117, 129, 213, 215, 291, 292.—Wendl., *Sert. Hanov.*, t. 4, 5, 10.—Spach, *Suit. à Buffon*, iiii. 466.—A. Gray, *Gen. Ill.*, t. 135.—Hook., *Icon.*, t. 597.—Harv. et Sond., *Fl. Cap.*, i. 180.—Andr., *Bot. Repos.*, t. 164.—Garcke, in *Bot. Zeit.* (1864), 17.—*Bot. Mag.*, t. 299, 304, 307.—Walp., *Ann.*, iii. 832; vii. 424.

[3] L., *Mantiss.*, n. 1255.—DC., *Prodr.*, 1, 496.—Spach, *Suit. à Buffon*, iii. 472.—Endl., *Gen.*, n. 5341.—B. H., *Gen.*, 223, n. 21—H. Bn., in *Adansonia*, iii. 176.

[4] Cav., *Diss.*, vi. t. 176, f. 1, 2; t. 177, f. 3; t. 178, f. 1; t. 181, f. 2; t. 200, f. 1, 2.—Jacq., *Hort. Schœnbr.*, t. 54, 201.—Andr., *Bot. Repos.*, t. 85.—Harv. et Sond., *Fl. Cap.*, i. 207.—*Bot. Reg.*, t. 224.—*Bot. Mag.*, t. 277, 353.—Walp., *Ann.*, vii. 426.

[5] L., *Gen.*, n. 829.—J., *Gen.*, 274.—Gærtn., *Fruct.*, ii. 153, t. 113.—Lamk., *Dict.*, iv. 81; Suppl., iii. 653; *Ill.* t. 571.—DC., *Prodr.*, 490.—Arn., in *Ann. Sc. Nat.*, sér. 2, ii. 235.—Endl., *Gen.*, n. 5337.—H. Bn., in *Adansonia*, iii. 177; ix. 344; in *Payer Fam. Nat.*, 289.—B. H., *Gen.*, 223, n. 23.

[6] They have a double tegument.

[7] Presl, in *Rel. Hœnk.*, ii. 150, t. 72.—Endl., *Gen.*, n. 5339.—B. H., *Gen.*, 223, n. 22.

or three Mexican *Melochias* whose flowers however are much larger. The cells of the capsular fruit have in all the *Melochias* a loculicidal dehiscence; but in those which are distinguished under the name of *Riedlea*[1] they are also separated from each other sooner or later. Among the *Dombeyas* too, where the ovary is generally quinquelocular there are some species with dicarpellary gynæceum; there has also been observed in Australia and described under the name of *Dicarpidium monoicum*,[2] a *Melochia*, having in its capsule only two bivalvate cells, which separate from each other at maturity. The genus *Melochia* contains fifty species[3] inhabiting all the warm regions of the globe. They are herbaceous, or frutescent plants more rarely arborescent, with alternate, narrow or cordate leaves generally dentate like a saw, glabrous, or more often covered with simple or stellate hairs. The flowers are terminal, or axillary, and arranged in glomerules or cymes which become a large compound terminal inflorescence when the upper leaves are replaced by bracts. These panicles are sometimes very much ramified in certain Asiatic and Oceanian *Melochias* which may have winged seeds, and of which the genus *Visenia*[4] is made. *Waltheria*[5] consists of *Melochias*, whose gynæceum has only one carpel, and whose ovary, containing two ascending ovules, is surmounted by an eccentric style with stigmatiferous dilated or fimbriate penicillate apex; some fifteen species[6] may be reckoned, which are natives of all the warm regions of the globe.

Melochia pyramidata.

FIG. 116.
Diagram.

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[1] VENT., *Choix de Pl.*, t. 37.—*Riedleia* DC., *Prodr.*, i. 490.—ENDL., *Gen.*, n. 5338.—*Mougeotia* H. B. K., *Nov. Gen. et Spec.*, v. 326, t. 483, 484.—*Polychlæna* G. DON, *Gen. Syst.*, i. 488.—? *Altheria* DUP.-TH., *Nov. Gen. Madag.*, 19.—*Lochemia* ARN., in *Ann. Sc. Nat.*, sér. 2, xi. 172.—*Physocodon* TURCZ., in *Bull. Mosc.* (1858), i. 212.—*Anamorpha* KARST. et TR., in *Linnæa*, xviii. 443.

[2] F. MUELL., in *Hook. Journ.*, ix. 302.—B. H., *Gen.*, 224, n. 24.—BENTH., *Fl. Austral.*, i. 235.—WALP., *Ann.*, vii. 428.

[3] CAV., *Diss.*, t. 172–175.—H. B. K., *Nov. Gen. et Spec.*, v. 322, t. 326, 482 (*Mougeotia*), t. 403, 483 a, 484.—A. S. H., *Fl. Bras. Mer.*, i. 156, t. 31, 32.—BL., *Bijdr.*, 88 (*Visenia*).—A. GRAY, *Gen. Ill.*, t. 134.—GRISEB., *Fl. Brit. W.-Ind.*, 93.—THW., *Enum. Pl. Zeyl.*, 30.—BENTH., *Fl. Austral.*, i. 234.—WIGHT, *Icon.*, t. 509.—A. GRAY, in *Amer. Expl. Exp., Bot.*, i. 191 (*Visenia*).—WALP., *Rep.*, i. 341, 351 (*Visenia*); ii. 796; v. 112, 115 (*Visenia*); *Ann.*, i. 108; ii. 166; iv. 324; vii. 427, 428 (*Anamorpha, Physocodon*).

[4] HOUTT., *Syst.*, vi. 287, t. 46, fig. 3—ENDL., *Gen.*, n. 5356.—H. BN., in *Adansonia*, iii. 180.—*Aleurodendron* REINW., in *Syll. Fl. Ratisb.*, ii 12—*Glossospermum* WALL., *Cat.*, n. 1153 (ex ENDL.)

[5] L., *Gen.*, n. 827.—J., *Gen.*, 289.—POIR., *Dict.*, viii. 323; Suppl., v. 412; *Ill.*, t. 570.—DC., *Prodr.*, i. 492.—SPACH, *Suit. à Buffon*, iii. 461.—ENDL., *Gen.*, n. 5336.—B. H., *Gen.*, 224, 983, n. 25.—*Lophanthus* FORST., *Char. Gen.*, 27, t. 14.—*Astropus* SPRENG., *N. Entd.*, iii. 64 (ex ENDL.).

[6] CAV., *Diss.*, t. 170, 171.—H. B. K., *Nov.*

VI. BYTTNERIA SERIES (CHOCOLATE FAMILY).

The *Byttneriads*[1] (figs. 117–122) have regular hermaphrodite flowers, with a convex receptacle. Their calyx is gamosepalous

Buettneria gracilipes.

Fig. 117.
Flower ($\frac{8}{1}$).

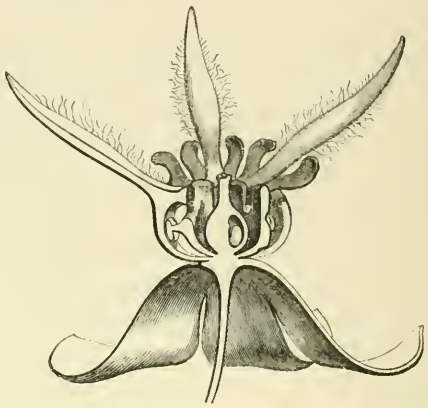

Fig. 119.
Longitudinal section of flower ($\frac{10}{1}$).

Fig. 118.
Diagram.

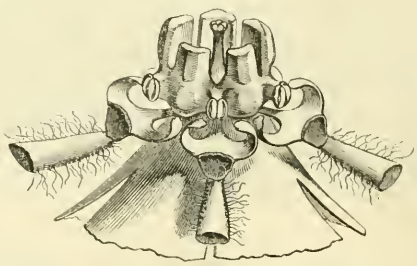

Fig. 120.
Sexual organs ($\frac{12}{1}$).

Gen. et Spec., v. 382.—Deless., *Ic. Sel.*, iii. t. 24.—A. S. H., *Pl. Us. Bras.*, t. 36; *Fl. Bras. Mer.*, i. 149, t. 30.—Griseb., *Fl. Brit. W.-Ind.*, 94.—Harv. et Sond., *Fl. Cap.*, i. 180.—Thw., *Enum. Pl. Zeyl.*, 30.—Benth., *Fl. Hongk.*, 38; *Fl. Austral.*, i. 235.—Mast., in *Oliv. Fl. Trop. Afr.* i. 234.—H. Bn., in *Adansonia*, x. 173.—Walp., *Rep.*, i. 340; ii. 796; *Ann.*, i. 108; iv. 323; vii. 429.

[1] *Buettneria* Lœfl., *It.*, 313. — L., *Gen.*, n. 268.—Adans., *Fam. des Pl.*, ii. 304.—J. *Gen.*, 277.—Lamk., *Dict.*, i. 522; Suppl., i. 752; *Ill.*, t. 140.—DC. *Prodr.*, i. 486 (part.).—Turp., in *Dict. Sc. Nat.*, Atl., t. 140.—Endl., *Gen.*, n. 5331.—Spach, *Suit. à Buffon*, iii. 489.—H. Bn., in *Adansonia*, iii. 167; ix. 336, t. 6, figs. 7–33; in *Payer Fam. Nat.*, 290.—B. H., *Gen.*, 225, n. 32.—Lem. et Dcne., *Tr. Gén.*, 343.—*Chætea* Jacq., *Enum.*, 17 (ex Endl.).—*Heterophyllum* Boj., mss.—*Telfairia* Newm., mss. (ex Hook., *Bot. Misc.*, i. 291, t. 61, nec Hook.).—*Pentaceros* G. F. Mey., *Prim. Fl. Essequeb.*, 136.

with five deep divisions, valvate or reduplicate in the bud. The petals are the same in number and alternate. They are composed of a slender claw surmounted by an elongated and valvate induplicate limb. Between these two parts is found a more or less cucullate dilatation with a biauriculate base, the concavity turned inwards and hiding a fertile stamen, while the edges of the hood adhere to a glandular surface which takes the place of an extrorse cell on each side of the sterile stamens. The androceum is formed of ten monadelphous pieces of which five are sterile, thick, tapering or truncated at the summit, glandular without towards the edges. They correspond to the divisions of the calyx; while the five fertile stamens superposed to the petals, are formed of a small filament detached below outside the common circumference of the androceum, and of an anther, articulate at the base with two lateral or extrorse cells, separated by a connective generally pretty large, and each dehiscing by a longitudinal cleft.[1] The gynæceum is free, superior, and formed of a sessile ovary with five oppositipetalous cells, surmounted by a style, whose stigmatiferous apex is divided into five branches, or five lobes, sometimes very short. In the internal angle of each cell is found a placenta, supporting two collateral or almost superposed, descending, incompletely anatropous ovules with the micropyle turned upwards and outwards. The fruit is a spherical capsule or nearly so, covered with prickles (fig. 121), whose cells detached from the axis afterwards open longitudinally by their interior edge. The seeds, which are often solitary in each cell, enclose under their thick coats a very voluminous embryo with conical inferior radicle surmounted by a cylindrical tigella, occupying the axis of the seed. Round this tigella the cotyledons are horizontally rolled, being reflexed upon it, surbased, formed of two very long lateral lobes which are triangular, similar to wings and become spirally convoluted upon each other. There are some fifty *Buettnerias*[2]

Buettneria grandifolia.

FIG. 121.
Fruit.

[1] M. H. MOHL (in *Ann. Sc. Nat.*, sér. 2, iii. 334) described the pollen grain as "a triangular prism, upon each lateral surface of which is an oval papilla placed longitudinally; in water, spherical with three papillæ (*B. heterophylla*)."

[2] AUBL., *Guian.*, t. 96.—CAV., *Diss.*, v. 290, t. 148–150.—JACQ., *Hort. Schœnbr.*, t. 46.—H. B. K., *Nov. Gen. et Spec.*, v. 314, t. 481 a, 481 b.—A. S. H., *Fl. Bras. Mer.*, i. 138, t. 27–29.—POHL., *Pl. Bras.*, ii. t. 145–154.—

which inhabit almost all the tropical regions of the globe. They are frutescent, suffrutescent or sometimes climbing plants often bearing prickles. The leaves are alternate, accompanied by lateral stipules; and the flowers in cymes sometimes umbelliferous, terminal or lateral and subaxillary,[1] sessile or pedunculate.

Beside the *Byttneriads* are placed three genera which are very nearly related to them, having also five fertile anthers alternate with five staminodes. These are *Ayenia*, which has the back of the petals naked or glanduliferous, anthers generally three-celled and fruit muricate; *Rulingia* (fig. 123) and *Commersonia*, whose petals have a large and concave base and a ligulate and sometimes short summit. The former have simple staminodes, and a smooth or echinate capsule; the latter have staminodes, generally tripartite, and a capsular fruit covered with soft and flexible hairs. All the preceding genera may be united into the subtribe of *Eubuettneriæ* having very close affinities with the *Lasiopetaleæ*. In the second subseries of *Theobromeæ* are found genera in which there are in the interval of the staminodes, not one, but two or several fertile stamens.

Buettneria salicifolia.

Fig. 122.
Flower ($\frac{4}{1}$).

Rulingia pannosa.

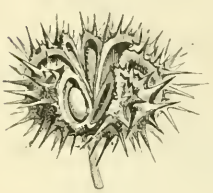

Fig. 123.
Dehiscent fruit ($\frac{2}{1}$).

The Cocoa trees (Fr., *Cacaoyers*[2]), (figs. 124–129), have regular hermaphrodite flowers. On their small convex receptacle are inserted five valvate sepals, and five alternate petals, whose limb is contorted in prefloration. Each of them presents a basilar portion, dilated into the shape of a spoon, which covers the fertile stamens, a contracted portion surmounting the first, and quite at the top a limb elongated in the form of a little band, flattened, obtuse at the summit

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Roxb., *Pl. Coromand.*, i. t. 29.—Wight, *Icon.*, t., 488.—Benth., *Fl. Hongk.*, 38.—Te. et Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 331.—Griseb., *Fl. Brit. W.-Ind.*, 92.—H. Bn., in *Adansonia*, x. 177.—Walp., *Rep.*, i. 338; ii. 796; v. 111; *Ann.*, i. 107; ii. 166; iv. 322; vii. 432.

[1] Often continued along the branches where they form prominent ribs in their adherent portion; they are detached on a level with a leaf or nearly so, but laterally. (See *Adansonia*, iii. 169.)

[2] *Theobroma* L., *Gen.*, n. 100.—J., *Gen.*, 276.—DC., *Prodr.*, i. 484.—Endl., *Gen.*, n. 5333.—H. Bn., in *Adansonia*, ii. 170; ix. 338, t. 5, figs. 1-6; in *Payer Fam. Nat.*, 291; in *Dict. Encycl. Sc. Méd.*, xi. 364.—B. H., *Gen.*, 225, n. 28.—*Cacao* T., *Inst.*, 660, t. 444.—Adans., *Fam. des Pl.*, ii. 344.—Lamk., *Dict.*, i. 533; Suppl., ii. 7; *Ill.*, t. 635.—Gærtn., *Fruct.*, ii. 190, t. 122.

and reflexed in anthesis. The stamens are monadelphous; they form at their base an urceolus, which surrounds the ovary and bears on its upper part five sterile staminodes superposed to the sepals, and longer than the ovary above which they terminate in a point, in addition to five pairs of oppositipetalous fertile stamens. For each

Theobroma Cacao.

FIG. 124.
Fruit-bearing branch ($\frac{1}{6}$).

FIG. 128.
Seed.

FIG. 126.
Diagram.

FIG. 129.
Longitudinal sect. of seed.

pair there is a common erect filament and four cells arranged in a cross, two superior and two inferior, each dehiscing outwardly by two longitudinal clefts. Two of these cells represent an anther,[1] but sometimes there are six cells, that is to say three anthers to

[1] The superior and inferior cells of the same side belong to the same anther laterally projected. The pollen is ovoid, with three folds, and in water ovoid or spherical, with three papillose bands. (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 334.)

each bundle.[1] The gynæceum is superior, formed like that of the Byttneriads of an ovary, with five oppositipetalous cells, surmounted by a style, with five stigmatiferous branches. But in the interior angle of each cell there is a placenta bearing an indefinite number of anatropous ovules, arranged in two transverse vertical series, with their raphes turned towards each other.[2] The fruit is a kind of berry[3] with a slightly fleshy wall, and which in the most useful species of the common Cacao tree[4] has almost the shape of a cucumber. Its exterior surface is rugose, mammillate, and traversed by ten equidistant longitudinal projections. The mesocarp is

Theobroma Cacao.

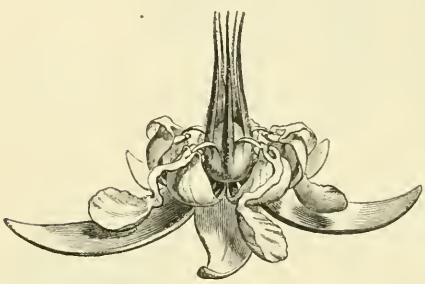

FIG. 125.
Flower ($\frac{6}{1}$).

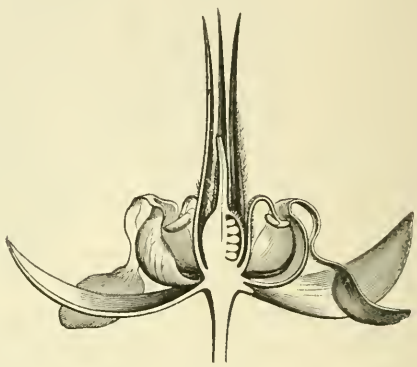

FIG. 127.
Longitudinal section of flower.

variable in colour[5] slightly fleshy, and indefinitely dried at maturity. The endocarp continues at first like a soft pulp[6] in which

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[1] In this case the third anther is superior and mesial.

[2] They have three coats.

[3] It is described by most authors as a drupe with a woody and plurilocular stone. "*Fructus drupaceus, putamine lignoso 5-loculari.*" (B. H., *Gen.*) But when it is ripe and still fresh, it is fleshy to the surface of the seeds. There is then a thin irregularly interrupted zone, which at a certain distance outside the internal surface of the endocarp is noticeable by its slightly woody consistency; but this appearance is due to fibro-vascular fascicles tolerably near each other, and the zone has not the characters of a real stone.

[4] *T. Cacao* L., *Spec.*, 1100.—DC., *Prodr.*, n. 1.—*Cacao sativa* LAMK., *Ill.*, t. 653.—*C. minus* GÆRTN., t. 122.—*C. Theobroma* TUSS., *Fl. Ant.*, t. 13.

[5] Varying from pale yellow to bright red or violet-purple, and very variable also as to its more or less elongated form, and the greater or less distinctness of the linear projections or of the longitudinal grooves and of the inequalities of the surface. Whence the possibility of distinguishing several varieties and races, whose qualities are slightly different, as happens in most of the cultivated fruit trees.

[6] Its origin is still unknown, and can only be certainly determined by the study of its development. It must not be admitted at first-sight that in its fleshy consistency it is analogous to the hairs which envelope the seeds of *Erioden-*

are niches for the numerous seeds. These (figs. 128, 129), which constitute the serviceable part of the Cacao tree, are irregularly ovoid and enclose under their coats a large embryo with short conical radicle hidden between the cotyledons which are thick, fleshy, corrugated and folded upon themselves, and between whose folds the albumen is scarcely represented by some mucous rudiments sometimes even wholly absent. Besides the common species the genus includes four or five others, all natives of tropical America.[1] These are trees or shrubs, with simple alternate petiolate leaves, accompanied by two small lateral caducous stipules. Their flowers are solitary, or arranged in racemose cymes growing in the axil of the existing leaves, or more frequently upon the wood of the trunk, and of the old branches, and in the axils of fallen[2] leaves.

Under the generic name of *Herrania* three or four Cacaos have been distinguished, whose petals, occasionally very long, are linear and involute-circinate in the bud, and whose leaves are compound-digitate, so that this genus scarcely deserves to be preserved. Beside it, on account of having multiovulate cells and fertile stamens, not solitary, the six following genera are placed in this subseries:—*Guazuma*, which generally has petals with linear bifid limb, two or three fertile stamens in each bundle, a muricate fruit, and seeds with fleshy albumen; *Scaphopetalum*, which has obovate-cucullate petals, without apiculate leaf, and ternate anthers, sessile upon the urceolus of the androceum, in the interval of the staminodes; *Leptonychia*, which has short and concave petals, and fertile stamens grouped in pairs, accompanied outside by one or several sterile stamens; *Abroma*, which has petals analogous to those of *Theobroma*, with superposed bundles, each formed of from two to four fertile stamens, and a membranous capsular fruit; finally, *Maxwellia*, which greatly resembles the *Lasiopetaleæ* by its very small glanduliform petals, but which has double fertile oppositipetalous stamens, an ovary with incomplete cells, and a woody indehiscent fruit with longitudinal wings.

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dron and which are, it is said, the cells of the endocarp stretched and dried. The pulp is also transversed here and there by slightly consistent longitudinal fascicles, seemingly dependent on the pericarp and the destroyed partitions.

[1] Aubl., *Guian.*, ii. 683, t. 275 (*Cacao*).—H. B., *Pl. Æquin.*, i. 104, t. 30.—H. B. K., *Nov. Gen. et Spec*, v. 315.—A. S. H., *Fl. Bras. Mer.* i. 147.—Griseb., *Fl. Brit. W.-Ind.*, 91.—Tr. et Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 336.—Walp., *Rep.*, 1, 339; *Ann.*, vii. 430.

[2] See *Adansonia*, ix. 343, 345.

Glossostemon Brugieri, a Persian shrub, with large palminerved leaves covered with stellate hairs, represents alone a special subseries, because its stamens, thirty-five in number, are arranged in five alternipetalous bundles, each formed of six stamens, with extrorse anthers, and surmounted by a petaloid tongue. Its fruit is an elongated capsule, bristling with prickles, and polyspermous. Its glabrous seeds enclose under their thick coats an embryo analogous to that of the greater part of the Buettneriads.

VII. LASIOPETALUM SERIES.

This series was at first formed of the single genus *Lasiopetalum*,[1] from which it derives its name. Since then it has been divided into

Thomasia corylifolia.

FIG. 130.
Floriferous branch.

FIG. 131.
Bud ($\frac{3}{1}$).

FIG. 133.
Long. sect. of flower ($\frac{6}{1}$).

FIG. 132.
Expanded flower ($\frac{3}{1}$).

[1] SM., in *Trans. Linn. Soc.*, iv. 216.—J. GAY, in *Mém. Mus.*, vii. 445, t. 18, 19.—DC., *Prodr.*, i. 489.—SPACH, *Suit. à Buffon*, iii. 495.—ENDL., *Gen.*, n. 5325.—PAYER, *Organog.*, 41, t. 9.—H. BN., in *Adansonia*, ii. 178; ix. 341.—B. H., *Gen.*, 228, 984, n. 40.—*Corethrostyles* ENDL., *Nov. Stirp. Mus. Vindob. Dec.*, n. 1; *Gen.*, n. 5326.

a tolerably large number of secondary genera, having its general organization, and only distinguished from it by very unimportant characters. Their flowers are hermaphrodite and pentamerous, with a very much developed, coloured valvate-reduplicate calyx, provided with five projecting angles or five wings, short in the bud. The petals are little visible, much smaller than the sepals and squamose; or they are altogether wanting in certain species. Five fertile stamens, slightly monadelphous, are superposed to them, each provided with a short filament and a two-celled anther.[1] They alternate with very short staminodes, which are often entirely wanting. The gynæceum is composed of five oppositipetalous carpels, or more rarely of three carpels, the two lateral ones being wanting; and the ovary contains two collateral ascending ovules, with exterior and inferior micropyle and two vertical series of ovules. The style has a stigmatiferous apex, entire or scarcely lobed. The fruit is dry, capsular, and loculicidal; and the seeds, often arillate,[2] enclose under their coats a straight embryo surrounded by a fleshy albumen. *Lasiopetalum* consists of Australian shrubs, covered with stellate hairs, with alternate, rarely opposite, entire, dentate sinuous, or rarely lobed leaves, accompanied by very small glanduliform stipules, scarcely visible, or very large and foliaceous. The flowers are grouped in terminal, leaf-opposed or lateral, simple, or compound false-racemes formed of cymes, often uniparous. Each flower is accompanied by a bract, or by two lateral bractlets, the union of which sometimes resembles a calyx. Twenty species[3] of this genera are described.

In *Lasiopetalum*, and the two allied genera, *Guichenotia* and *Lysiopetalum*, forming with them the subseries (*Eulasiopetaleæ*), the anthers open by very short clefts or pores. In *Thomasieæ* (*Thomasia*, figs.

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[1] The anthers often have grooves of extrorse dehiscence; but their apex turns back upon the internal face of the anther for a short distance, and it is this which makes the dehiscence. The short clefts have been often described as pores (see as to the peculiarities of the anthers of *Lasiopetaleæ*, *Adansonia*, ii. 179; ix. 342). The pollen is the same as that of *Theobroma*, *Guazuma*, &c. (H. Mohl., in *Ann. Sc. Nat.*, sér. 2, iii. 334).

[2] The exostome thickens early into a caruncle. Besides which, the raphe also presents an arillate elongated thickening in certain *Lasiopetaleæ*.

[3] Rudge, in *Trans. Linn. Soc.*, x. 297, t. 12.—Venten., *Jard. Malmais.*, t. 59.—Sm., in *Andr. Bot. Repos.*, t. 208.—Steud., in *Pl. Preiss.*, i. 235.—Steetz., in *Pl. Preiss.*, ii. 339.—Hook., *Journ. Bot.*, ii. 414.—Turcz., in *Bull. Mosc.* (1852), ii. 145.—Hook. f., *Fl. Tasm.*, i. 51.—F. Muell., *Pl. Vict.*, i. 36 (*Corethrostylis*), 143, t. 3; *Fragm.*, ii. 5.—Benth., *Fl. Austral.*, i. 257.—*Bot. Reg.* (1844), t. 47 (*Corethrostylis*).—*Bot. Mag.*, t. 1766, 3908.—Walp., *Rep.*, i. 336; v. 110; *Ann.*, ii. 164; iv. 321; vii. 437.

130–133, *Hannafordia*, *Guichenotia*) the lines of dehiscence occupy the length of the anther. In the subseries *Seringieæ* (*Seringia* and *Keraudrenia*), the mode of dehiscence is the same, but the carpels instead of being united for a variable distance by their internal edge, are distinct and isolated, at least in the ripe fruit. *Keraudrenia* has a calyx which becomes developed and coloured after anthesis; this never occurs in *Seringia*, whose embryo, moreover, is straight. Almost all the species of this genus are Australian.

VIII. MALLOW SERIES (Fr., *Les Mauves*).

The Mallows[1] (figs. 134–140) have regular, pentamerous hermaphrodite flowers. Their convex receptacle bears from below upwards an epicalyx, a calyx, a corolla, numerous stamens, and an

Malva sylvestris.

FIG. 134.
Floriferous branch ($\frac{1}{2}$).

[1] *Malva* T., *Inst.*, 94, t. 23, 24,—L., *Gen.*, n. 841.—ADANS., *Fam. des Pl.*, ii. 400.– J., *Gen.*, 272.—GÆRTN., *Fruct.*, ii. 245, t. 136.—LAMK., *Dict.*, iii. 739; Suppl., iii. 610; *Ill.*, t. 582.—DC., *Prodr.*, i. 431 (part.).—SPACH, *Suit à Buffon*, iii. 345.—ENDL., *Gen.*, n. 5271.—DUCHATRE, in *Ann. Sc. Nat.*, sér. 3, iv. 148, 149.—PAYER, *De la Fam. des Malvac.* (thès. Par., 1852), 9, 18; *Organog.*, 29, t. 8.—A. GRAY, *Gen. Ill.*, t., 116.—B. H., *Gen.*, 201, n. 6.—H. BN., in *Payer Fam. Nat.*, 282 (incl.: *Anthema* MEDIK., *Callirhoe* NUTT., *Nuttallia* BART., *Malvastrum* DC., *Malvella* JAUB. et SPACH, *Nototriche* TURCZ., *Phyllanthophora* A. GRAY).

indefinite number of carpels. The calyx is gamosepalous and quinquefid, and its lobes are arranged in the bud in valvate præfloration, often a little reduplicate. The petals at their base are united among themselves and with the lower part of the androceum. They fall in a single piece as gamopetalous corollas do, and they are contorted in præfloration. The stamens are indefinite in number[1] and mona-

Malva sylvestris.

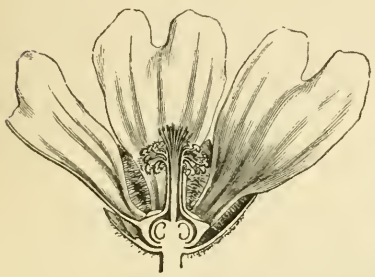

Fig. 135.
Longitudinal section of flower ($\frac{2}{1}$).

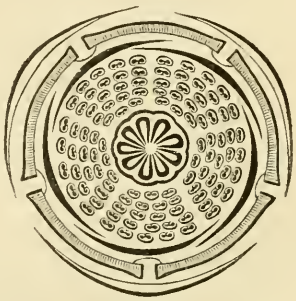

Fig. 136.
Diagram.

Fig. 138.
Fruit ($\frac{1}{1}$).

Fig. 137.
Flower, without the perianth ($\frac{5}{1}$).

Fig. 140.
Long. sect. of carpel.

Fig. 139.
Carpel ($\frac{5}{1}$).

delphous. Their filaments form a tube surrounding the gynæceum, and which in its upper part as far as the apex, is divided into as many small tongues as there are anthers. These are reniform, one-celled,[2] extrorse, dehiscing by a longitudinal cleft.[3] The ovary is superior. Its cells are verticillate all round the upper part of the floral receptacle; and they are surmounted by a style more or less

[1] According to Payer (*Organog.*, 32), the androceum is formed of ten series of stamens often superposed in pairs to the petals, each series being capable of deduplication since the pieces of each of them deduplicate, the evolution of the stamens being carried on from within outwardly (or from above downwards) in each series.

[2] The rudiment of the partition which is observed in their interior represents, not the separation of the two cells, but the projection more or less complete, which is produced earlier between the two parts of the same cell, and is afterwards more or less completely reabsorbed.

[3] The pollen is formed of spherical and spiked grains. It is also remarkable for its round pores irregularly scattered, and a punctuate external membrane. The pores and the spikes are numerous and small in size in most species of *Malva*, *Althæa*, *Sida*, *Lavatera*, *Napæa* and *Gossypium*. (H. Mohl, in *Ann. Sc. Nat.*, sér. 2, iii. 334.)

gynobasic, divided into as many slender thread-like branches as there are cells in the ovary. Within, on each branch of the style, there is a longitudinal groove more or less decided, with lips furnished with stigmatic papillæ. There is in each cell, towards the base of the internal angle a placenta supporting a single anatropous ascending ovule, with the micropyle looking downwards and outwards.[1] The fruit, accompanied by the persistent calyx, is dry, formed of a verticil of achenes which, at maturity, separate from each other, and are detached from the common receptacle. Each of them encloses an ascending seed, containing under its coats an embryo with inferior radicle, and cotyledons contortuplicate, crumpled, more or less folded upon themselves, and enveloping the radicle to a greater or less extent. The albumen is totally wanting at maturity, or is only represented by small mucilaginous masses interposed to the folds of the embryo (fig. 140). The Mallows are herbaceous or suffrutescent plants, slightly glabrous and covered with hairs. They have alternate, petiolate leaves, accompanied by two lateral, generally large, foliaceous stipules. The limb is ordinarily digitate-nerved, dentate, angular, lobed or dissected. The flowers[2] are solitary, or usually united in cymes in the axils of the leaves with pedicels sometimes short or even almost wanting. When the leaves towards the summit of the branches are replaced by bracts, the cymes situated in the axil of these are arranged in more or less elongated racemes. Immediately under each flower are found three free foliaceous bracts, which form the involucel or the subcalyx. Fifteen or sixteen species[3] of Mallows proper are known; they inhabit Europe, the temperate regions of Asia, North Africa, and some of them have penetrated into all parts of the world.

Under the name of *Callirhoe*,[4] six or seven[5] Mallows of North

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[1] There are two coats in most *Malvaceæ*.

[2] Pink, white or purple.

[3] Cav., *Diss.*, ii. v. icon.—Reichb., *Ic. Fl. Germ.*, v. t. 166–172.—Gren. et Godr., *Fl. de Fr.*, i. 238.—Wight *Icon.*, t. 950.—Jacq., *Hort. Schœnbr.*, t. 139; *Ic. Rar.*, t. 139; *Hort. Vindob.*, t. 35, 141, 156.—Torr. et Gray, *Fl. N.-Amer.*, i. 225.—H. B. K., *Nov. Gen et Spec.*, v. 274.—A. S. H., *Fl. Bras. Mer.*, i. 213.—A. Gray, *Man.*, ed. 5, 66.—Griseb., *Fl. Brit. W.-Ind.*, 72 (*Malvastrum*).—Tr. et Pl. in *Ann. Sc. Nat.*, sér. 4, xvii. 153.—Harv. et Sond. *Fl. Cap.*, i. 159.—Benth., *Fl. Austral.*, i. 186.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 177.—*Bot. Reg.*, t. 1306.—*Bot. Mag.*, t. 1998, 2179, 2298, 3698, 4681.—Walp., *Rep.*, i. 292; *Ann.*, i. 99; ii. 139; iv. 297 (part.); vii. 386.

[4] Nutt., in *Journ. Acad. Philad.*, ii. 181.—A. Gray, *Gen. Ill.*, t. 117, 118.—H. B., *Gen.*, 201, n. 7.—*Nuttallia* Bart., *Fl. N.-Amer.*, ii. 74, t. 62 (nec DC., nec Torr., nec Dicks.).

[5] Hook., *Exot. Fl.*, t. 171, 172; in *Bot. Mag.*, t. 3287 (*Nuttallia*).—*Bot. Reg.*, t. 1938 (*Nuttallia*).—Walp., *Ann.*, ii. 149; iv. 298 (*Malva*); vii. 388.

America have been distinguished, which have carpels tapering at the apex into a sort of short hollow beak, whose cavity is separated by an interior processus horizontally directed. If to this

Althæa officinalis.

Fig. 141.
Floriferous branch ($\frac{1}{4}$).

character were always added the dehiscence of the carpels into two valves and the reduction of the bracts of the involucel to two or one, or if they were even totally absent, this genus *Callirhoe* might be kept distinct; but their inconstancy makes it seem preferable to us to make it only a section of the genus *Malva*.

It is also of sixty[1] American and African Mallows that the genus *Malvastrum*[2] has been made. In some types of a section *Phyllanthophora*,[3] there is no epicalyx, and the carpels open, or are provided with two dorsal prickles; but in the other species of *Malvastrum* these characters disappear, and to distinguish them from the Mallows to which they[4] have been joined as a section, there only remains the form of the branches of the style, truncate or capitate at the apex. It is impossible for us to consider the characters above as sufficient to distinguish a genus, and therefore we admit four sections in the genus *Malva*,[5] such as we have just defined it.

Plagianthus divaricatus.

FIG. 142.
Floriferous branch.

Beside the Mallows are ranged three genera in a subseries of *Eumalveæ*, which differ but little from them. These are, first, the Marsh Mallows (*Guimauves*) (fig. 141), having the same flowers and all the same characters of vegetation, but whose involucre is formed of from six to nine leaves, united below into a gamophyllous envelope; then *Sidalcea* and *Napæa*, which have no involucre, the former remarkable by its androceum, with double column, the outer one being pentadelphous, while the inner stamens form a distinct bundle composed of an indefinite number of pieces; the latter is characterized by its dicœcious flowers.

Sida, having the general characters of the Mallows, forms the head of a distinct subseries, *Sideæ*, because the ovule is descending, with the micropyle looking inwards, instead of being ascending,

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[1] JACQ., *Hort. Vindob.*, t. 156; *Ic. Rar.*, t. 139.—DC., *Prodr.*, i. 430.—HOOK., *Ic.*, t. 385 (*Sida*); in *Bot. Mag.*, t. 3698.—HARV. et SOND., *Fl. Cap.*, i. 159.—C. GAY, *Fl. Chil.*, i. 295, t. 7.—WALP., *Rep.*, i. 292; ii. 788; v. 88; *Ann.*, i. 99; ii. 151.

[2] DC., *Prodr.*, i. 430.—A. GRAY, *Pl. Feudler.*, 21 (1848); *Gen. Ill.*, t. 121, 122.—B. H., *Gen.*, 202, 982, n. 10 (incl. *Malvella* JAUB. et SPACH, *Ill. Pl. Or.*, v. (1853), 47, t. 444.—See p. 140, note 4).

[3] A. GRAY, *Amer. Expl. Exp. Bot.*, i. 151.—*Malvastrum* WEDD., *Chlor. Andin.*, ii. 277, t. 80 (nec A. GRAY).

[4] WEDD. *loc. cit.*

[5] MALVA sect. 4.
1. *Eumalva.*
2. *Callirhoe* (NUTT).
3. *Malvastrum* (DC.).
4. *Phyllanthophora* (A. GRAY).

with the micropyle looking outwards. This character has here, however, as elsewhere, a merely artificial[1] value. To this subseries belong the allied genera *Bastardia, Anoda, Cristaria,* and the slightly exceptional genera *Hoheria* and *Plagianthus:* the former (fig. 143) remarkable for its carpels, surmounted by a dorsal and vertical wing; the latter (fig. 142) is noticeable by its flowers, often reduced, which may have only one carpel to the gynæceum, and only one ovule in each carpel, and whose flowers are sometimes polygamous, but which in the most perfect species has a pluricarpellary gynæceum; it is, however, quite inseparable from *Sida.*

Abutilon (fig. 144) has given its name to a third subseries, in which, although all the organization is that of the Mallows, each carpel encloses more than one ovule, often two, ascending, with inferior and exterior micropyle, sometimes a larger number; some ascending, others horizontal or descending. Beside it is ranged in this small group the five nearly allied genera: *Wissadula, Sphæralcea, Modiola, Howittia,* and *Kydia,* which only differ from it by the number or absence of the bractlets of the epicalyx, or by the presence in the carpels of a more or less complete false transverse partition.

Hoheria populnea.

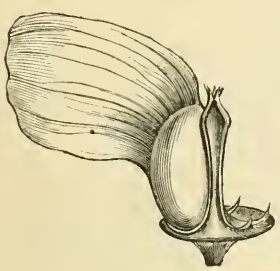

Fig. 143.
Portion of the fruit[2] ($\frac{4}{1}$).

Abutilon striatum.

Fig. 144.
Flower.

IX. MALOPE SERIES.

Malope[3] (figs. 145–148) has regular hermaphrodite flowers with convex receptacle very analogous in exterior to that of the Mallows. The calyx is gamosepalous with five lobes valvate reduplicate in the

[1] As demonstrated by the example of *Malvella* (see p. 90, note 2), the ovule of which is sometimes ascending and sometimes descending. [See also on this subject the *Thèse* of Payer (15, not.), where the value of the direction of the ovule is equally contested.]

[2] Fig. de Raoul, *Ch. de Pl. N.-Zél.*, t. 26.

[3] *Malope* L., n. 841.—J., *Gen.*, 272.—Lamk., *Dict.*, iii. 689; Suppl., iii. 582; *Ill.*, t. 583.—DC., *Prodr.*, i. 429.—Spach, *Suit. à Buffon*, iii. 344.—Endl., *Gen.*, n. 5267.—Payer, *Organog.*, 40, t. 8.—B. H., *Gen.*, 200, n. 1.—H. Bn., in *Payer Fam. Nat.*, 283.

bud. The corolla is formed of five twisted petals united at their base with that of the tube of the androceum which is in a single piece, dilated at the base, traversed in its length by the styles, divided above into an indefinite number of filaments and sur-

Malope trifida.

FIG. 145.
Floriferous branch ($\frac{1}{2}$).

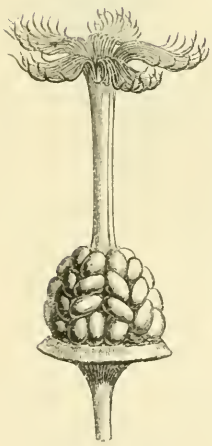

FIG. 147.
Gynæceum ($\frac{8}{1}$).

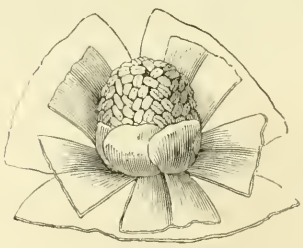

FIG. 146.
Young expanded flower.

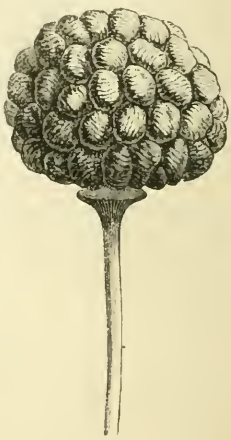

FIG. 148.
Fruit ($\frac{3}{1}$).

mounted by a one-celled extrose anther, dehiscing by a longitudinal cleft. The gynæceum is composed of a great number of carpels whose independent ovaries are arranged in vertical[1] series upon the

[1] More or less distinct according to the age, and arranged, according to PAYER, upon five prominent angles of the receptacle superposed to the sepals. (See A. DICKSON, in *Adansonia*, iv. 207.)

cone of the receptacle, and surmounted by gynobasic styles united into a hollow column divided in its upper portion into a great number of reflexed filiform branches, stigmatiferous along their internal edge. Each ovary encloses an ascending ovule with micropyle looking downwards and outwards. The fruit (fig. 148) accompanied at its base by the persistent calyx and epicalyx is formed of a great number of achenes, grouped upon the receptacle, from which they separate at maturity. Each encloses an ascending seed, with embryo analogous to that of the Mallows. Malope consists of annual herbs of the Mediterranean region, glabrous, or covered with hairs, with alternate, entire, or trifid leaves whose petiole is provided at the base with two lateral stipules.

The flowers are axillary and borne by a peduncle on which is inserted quite against the calyx three free cordate bracts forming an involucel or epicalyx.[1] Three species[2] are known. With Malope this section includes two very analogous genera with styles stigmatiferous at the apex. These are: *Kitaibelia* (fig. 149) of which we only know as yet one European species having a epicalyx of more than five bracts united below, and carpels first arranged like those of Malope, but partly aborting after anthesis; a small number of them enclose a fertile seed and open longitudinally by their dorsal edge to let it escape; and *Palava*, consisting of South American plants, with flowers totally destitute of involucre, the divisions of the style thickened in their upper part, the carpels indehiscent at maturity and detached from the receptacle and flowers axillary solitary and pedunculate.

Kitaibelia vitifolia.

FIG. 149.
Fruit ($\frac{1}{1}$).

[1] According to PAYER (*loc. cit.* 29), "it has three lobes, of which one is posterior, and represents the bract, while the two others are anterior, and represent the two stipules."

[2] CAV., *Diss.*, ii. t. 27, figs. 1, 2.—REICHB., *Ic. Fl. Germ.*, v. t. 165.—BOISS., *Diagn.*, ii. 100.—GREN. et GODR., *Fl. de Fr.*, i. 287.—WALP., *Rep.*, i. 290; v. 88; *Ann.*, vii. 382.

X. URENA SERIES.

Urena[1] (fig. 150) has flowers constructed nearly like those of the Mallows; they have the same corolla, androceum, seed and embryo. Their calyx is gamosepalous and valvate. The tube of the androceum is truncate or quinquedentate[2] at its apex. The gynæceum is composed of five carpels superposed to the petals.[3] The ovaries free among themselves are only attached to the columella by their inner edge. Each of them encloses an ovule inserted towards the base of its inner angle, ascending, with exterior[4] micropyle. But these five carpels are surmounted by a style with ten branches, of which five are superposed to the ovaries, and five alternate.[5] At maturity the monospermous, glochidiate, indehiscent carpels separate from the columella. Four or five *Urenas*[6] are known growing in tropical Asia and Africa. They are herbs or shrubs with alternate stipulate leaves generally angular or lobed. The flowers are sessile or pedunculate, axillary or arranged in terminal spikes. They are enveloped by a quinquefid involucre, with lobes alternating with those of the calyx. This series may be divided into three subseries: *Eurenieæ* (*Urena*), where the ovary cells are oppositipetalous; *Pavonieæ* (*Pavonia* [fig. 151], *Malachra*, *Gœthea*), where they are generally alternate, and

Urena lobata.

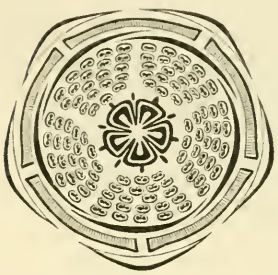

Fig. 150. Diagram.

Pavonia hastata.

Fig. 151. Fruit.

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[1] L., *Gen.*, n. 844.—Adans., *Fam. des Pl*, ii. 400.—J., *Gen.*, 272.—Gærtn., *Fruct.*, i. 252, t. 135.—Poir., *Dict.*, viii. 252; Suppl., v. 404.—Lamk., *Ill.*, t. 583.—DC., *Prodr.*, i. 441.—Endl., *Gen.*, n. 5274.—Payer, *Organog.*, 39, t. 7.—B. H., *Gen.*, 205, n. 25.—H. Bn., in *Payer Fam. Nat.*, 282.

[2] The teeth are oppositipetalous.

[3] A. Dickson, in *Adansonia*, iv. 308, t. 6, fig. 7.

[4] It has a double coat.

[5] Which is, as demonstrated by Payer, that of the ten pre-existing carpels, five only having developed their ovary, the five others remain reduced to a style. It was formerly believed that each ovary corresponded to a pair of styles.

[6] Cav., *Diss.*, vi. t. 183–185.—Coll., *Hort. Ripul.*, t. 26.—Schrank, *Hort. Monac.*, t. 79.—H. B. K., *Nov. Gen. et Spec.*, v. 277.—A. S. H., *Pl. Us. Bras.*, t. 56; *Fl. Bras. Mer.*, i. 219.—Wall., *Pl. As. Rar.*, t. 26.—Griseb., *Fl. Brit. W.-Ind.*, 81.—Tr. et Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 158.—Seem., *Fl. Vit.*, 16.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 189.—*Bot. Mag.*, t. 3049.—Walp., *Rep.*, i. 297; v. 89; *Ann.*, ii. 140; iv. 302; vii. 399.

Malvavisceæ (*Malvaviscus*), whose fruit is partly fleshy the cells being oppositipetalous.

XI. ROSE MALLOW SERIES (*Fr.*, *Ketmies*).

The Rose Mallows[1] (figs. 152–161) have flowers analogous to those of the Mallows. Their calyx is gamosepalous with five valvate lobes; and the corolla, gamopetalous at the base and united with that of the androceum, is contorted in præfloration. The stamens form a tube with truncate or quinquedentate apex whence are detached an indefinite number of slender summits surmounted by a one-celled anther with longitudinal[2] dehiscence. The gynæceum is composed of an ovary with free alternipetalous cells. In the inner angle of each cell a placenta is seen supporting either an indefinite number of ovules arranged in two vertical series, or only three or four ovules. The fruit (fig. 159), around which the calyx and epicalyx persist, is loculicidal, and at maturity allows reniform seeds to escape, often more or less abundantly covered with hairs and enclosing under their coats a thick embryo with large cotyledons more or less folded upon themselves. Between their folds is often seen an inconsiderable mucous albumen. The Rose Mallows are arborescent, frutescent or herbaceous plants, glabrous, tomentose or

Hibiscus roseus.

FIG. 152.
Flower.

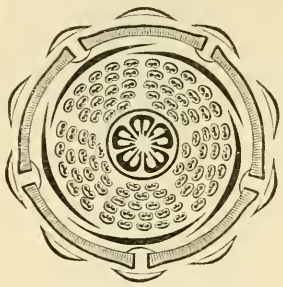

FIG. 153.
Diagram.

[1] L., *Gen.*, n. 846.—J., *Gen.*, 271.—GÆRTN., *Fruct.*, ii. 250, t. 134.—LAMK., *Dict.*, iii. 347; Suppl., iii. 216; *Ill.*, t. 584.—DC., *Prodr.*, i. 446.—SPACH, *Suit. à Buffon*, iii. 371.—ENDL., *Gen.*, n. 5277.—DUCHATRE, in *Ann. Sc. Nat.*, sér. 3, iv. 149, t. 7.—PAYER, *Organog.*, 37, t. 6.—A. GRAY, *Gen. Ill.*, t. 133.—H. BN., in *Payer Fam. Nat.*, 279.—B. H., *Gen.*, 207, 982, n. 34 (incl.: *Abelmoschus* MEDIK., *Lagunaria* G. DON, *Lagunæa* CAV., *Paritium* A. S. H., *Senra* CAV., *Trionæa* MEDIK.).—*Ketmia* T., *Inst.*, 99, t. 26.—ADANS., *Fam. des Pl.*, ii. 399.

[2] The pollen is formed of spherical or spiked grains. "Long spines, few in number; large pores, few in number. *H. Trionum*, *H. syriacus*." (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 334.) The anther generally presents the rudiment of a partition at its base.

hispid, with alternate, stipulate, simple, entire, or more or less deeply cut or partite leaves. The flowers are axillary, terminal or lateral, accompanied by from three to five, or more often by an indefinite number of bracts, free, or united for a variable distance and forming

Hibiscus syriacus.

Fig. 157.
Flower, without the perianth ($\frac{2}{1}$).

Fig. 154.
Floriferous branch ($\frac{1}{2}$).

Fig. 158.
Gynæceum ($\frac{3}{1}$).

a caducous or persistent epicalyx. The Rose Mallows proper[1] have the bracts of the involucre entire, the calyx quinquefid not swollen, and the seed glabrous. In *Furicaria*,[2] the bracts of the involucre are dilated at their summit into a foliaceous plate, or they are more or less deeply bifurcate; most of their organs are bristling with rigid hairs. *Trionum*[3] consists of herbaceous species with swollen vesicular calyx. *Abelmoschus*,[4] often distinguished as forming a particular genus, has a long gamosepalous calyx generally irregularly torn at the base and an elongated fruit, with vertical prominent ribs. *Bombycella*[5] comprises

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[1] *Ketmia* Endl. [incl. : *Cremontia* Commers. (ex DC.), *Ketmia* DC., *Sabdariffa* DC.].

[2] DC., *Prodr.*, 449, sect. v.

[3] Medik., *Malvac.*, 46.—DC., *Prodr.*, sect. viii.—*Trionæa* B. H., *Gen.*, 208.

[4] Medik., *Malvac.*, 45.—Endl., *Gen.*, 982. —*Bamia* R. Br., mss. (ex Endl.).—*Hymenocalyx* Zenk., *Pl. Ind.*, t. 10 [incl. sect. (iii.) *Manihot* DC., *Prodr.*, 448 et sect. (v.) *Abelmoschus* DC. (part.), *Prodr.*, 449].

[5] DC., *Prodr.*, 458 (sect. vii.).—*Bombyx* Medik., *Malvac.*, 44.—*Bombycodendron* Zoll. (ex Hassk., *Pl. Jav. Rar.*, 301).

Hibiscus whose flowers are small, the seed covered with a cottonous down, and the epicalyx sometimes very small or altogether wanting.

Hibiscus syriacus.

FIG. 155.
Bud.

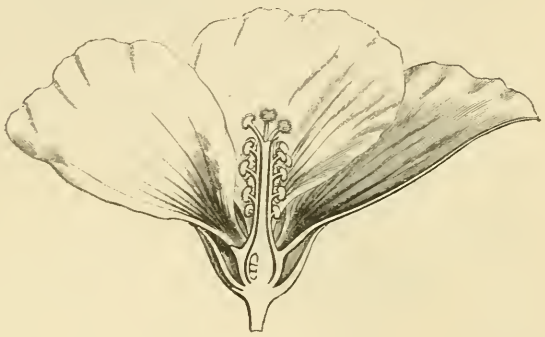

FIG. 156.
Longitudinal section of flower.

It is the same in *Lagunea*,[1] consisting of species of *Hibiscus* with seeds glabrous or covered with very short hairs, and *Lagunaria*[2] which

Hibiscus syriacus.

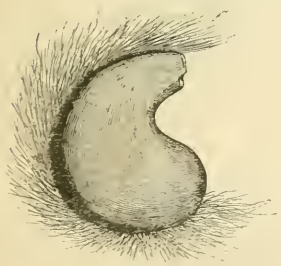

FIG. 160.
Seed ($\frac{8}{1}$).

FIG. 159.
Fruit.

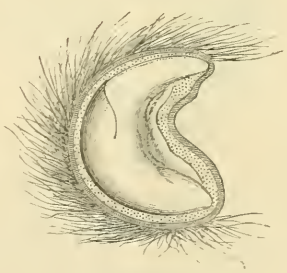

FIG. 161.
Longitudinal section of seed.

has a thin endocarp separable from the exocarp, and most of the organs covered with a fine scaly down. Finally *Paritium*,[3] generally separated as a genus, consists of Rose Mallows with large cordate

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[1] CAV., *Diss.*, 173, t. 71, fig. 1 (nec *alior.*). —*Triguera* CAV., *Diss.*, 41 (nec 107).

[2] G. DON, *Gen. Syst.*, i. 485.—ENDL., *Gen.*, n. 5282.—B. H., *Gen.*, 35, n. 208.—*Lagunea* VENT., *Malmais.*, t. 42.—TURP., in *Dict. Sc. Nat.*, Atl., t. 138.—SIMS, in *Bot. Mag.*, t. 769.

[3] GÆRTN., *Fruct.*, t. 51.—A. JUSS., in *A. S. H.*

leaves, epicalycine bractlets united among themselves at the base, and a membranous endocarp sending into the middle of each cell a false partition, more or less prominent, which divides it more

Gossypium herbaceum.

Fig. 163.
Flower ($\frac{1}{2}$).

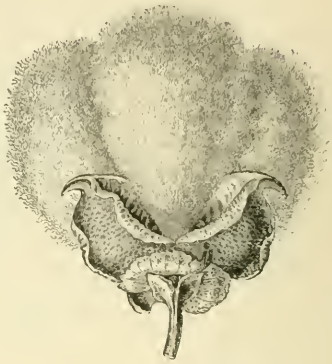

Fig. 164.
Dehiscent fruit.

Fig. 165.
Seed.

Fig. 162.
Bud.

Fig. 166.
Longitudinal section of seed.

or less completely into two demicells. With *Senra incana*,[1] an Asiatic and African undershrub having three large cordate bracts round its flowers and ovary cells with two or three ovules, the genus *Hibiscus* thus defined[2] comprehends more than a hundred and fifty

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Fl. Bras. Mer., i. 198.—Endl., *Gen.*, n. 5283.—*Parita* Scop., *Introd.*, n. 1276.—*Pariti* Rheed., *Hort. Malab.*, i. t. 30.—*Azanza* Moç. et Sess. (ex DC., *Prodr.*, i. 453, sect. x.).

[1] Cav., *Diss.*, ii. 83, t. 35, fig. 3.—DC., *Prodr.*, i. 457.—B. H., *Gen.*, 207, n. 33.—*Senræa* W., *Spec.*, iii. 695.—*Serræa* Endl., *Gen.*, n. 5280. — *Dumreichera* Steud. et Hochst., in *Flora* (1838), i. *Intellb.*, 26.

[2] Hibiscus sect. 9.
1. *Furcaria* (DC.).
2. *Bombycella* (DC.).
3. *Ketmia* (Endl.).
4. *Abelmoschus* (Medik.).
5. *Trionum* (Medik.).
6. *Lagunæa* (Cav.).
7. *Lagunaria* (Don).
8. *Paritium* (A. Juss.).
9. *Senra* (Cav.).

species[1] found in all the hot regions of the globe, tropical and extra-tropical.

Beside the Rose-Mallows are placed the Cottons (*Cotonniers*) (figs. 162–166), forming a very nearly allied genus, with flowers surrounded by a large involucre of three cordate bracts (fig. 162), and having a gamosepalous calyx, truncate, or not very deeply divided by five clefts, a style with clavate apex, traversed by three or five longitudinal grooves, and a fruit with three or five cells, containing an indefinite number of seeds, and with an exterior envelope covered with long filamentous hairs constituting the Cotton. *Thespesia* and *Fugosia* are also very nearly related to the Cottons. The same may be said of *Kosteletzkya*, which, with or without epicalyx, has five cells in the ovary and styles formed like those of *Hibiscus*, but with only one ovule in each of them; and *Decaschistia*, whose uniovulate cells are ten in number, and whose epicalyx is formed of ten bracts. In *Julostyles* and *Dicellostyles*, genera which recall by their habit the *Bombaceæ* and *Helicteres*, there are only two biovulate cells to the ovary, and both have an epicalyx of at least four bracts connate at the base. But the former have a diplostemonous androceum, and the latter an indefinite number of stamens. These two genera, natives of tropical Asia, may be united, on account of these particular features, into a little subseries, *Julostyleæ*.

XII. BOMBAX SERIES (Fr., *Fromagers*).

Bombax[2] (fig. 167) has regular hermaphrodite flowers with a receptacle the summit of which is slightly concave, and on account of

[1] Cav., *Diss.*, t. 50–55, 58–70.—H. B. K., *Nov. Gen. et Spec.*, v. 288, t. 478.—A. S. H., *Fl. Bras. Mer.*, i. 242, t. 48; 255 (*Paritium*).—Wall., *Pl. As. Rar.*, i. t. 44 (*Abelmoschus*).—Wight, *Icon.*, t. 7 (*Paritium*), 6, 41, 154, 197, 399, 951 (*Abelmoschus*), 1592 (*Senra*).—Reichb., *Ic. Fl. Germ.*, v. t. 181, 182.—Dcne., in *Ann. Sc. Nat.*, sér. 2, iv. t. 4 (*Senra*).—Sieb. et Zucc., *Fl. Jap.*, t. 93 (*Paritium*).—Hassk., *Pl. Jav. Rar.*, 301 (*Bombycodendron*).—Harv. et Sond., *Fl. Cap.*, i. 170.—Harv., *Thes. Cap.*, t. 73.—Benth., *Fl. Austral.*, i. 207.—Griseb., *Fl. Brit. W.-Ind.*, 84.—A. Gray, *Man.*, ed. 5, 68.—Thw., *Enum. Pl. Zeyl.*, 26.—Tr. et Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 165, 169 (*Paritium*).—Seem., *Fl. Vit.*, 16.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 194.—H. Bn., in *Adansonia*, x. 174.—*Bot. Mag.*, t. 5245 (*Paritium*).—Walp., *Rep.*, i. 302, 307 (*Senra*), 308 (*Abelmoschus*); ii. 790; iii. 830; iv. 318 (*Senra*); v. 91, 92; *Ann.*, i. 100, 101, 959; ii. 142; iv. 304; vii. 402.—Hook. et Mast., *Fl. of Ind.*, 344.

[2] *Bombax* L., *Gen.*, n. 835.—J. *Gen.*, 275.—Lamk., *Dict.*, ii. 550; Suppl., ii. 675 (part.).—DC., *Prodr.*, i. 478.—Endl., *Gen.*, n. 5300.—H. Bn., in *Payer Fam. Nat.*, 286.—B. H., *Gen.*, 210, n. 42.—*Eriotheca* Schott, *Melet.*, 35.—Endl., *Gen.*, n. 5301.—*Salmalia* Schott, *loc. cit.*—Endl., *Gen.*, n. 5303.—*Ceiba* Mart. et Zucc., *Nov. Gen. et Spec.*, i. 95, not.—*Gossampinus* Hamilt., in *Trans. Linn. Soc.*, xv. 128 (ex. Endl.).–Hook. & Mast., *Fl. of Ind.*, 349.

this the insertion of the perianth is somewhat perigynous. The calyx is gamosepalous with the edges cut straight, or more often divided into from three to five obtuse unequal lobes. The corolla is malvaceous with five very deep divisions, contorted in præfloration. Its lower part is in one single piece, and united thus far with the base of the androceum. This is formed of an indefinite number of stamens, with filaments free in the greater portion of their length, but more or less distinctly united towards the base into five bundles. The anthers are

Bombax Ceiba.

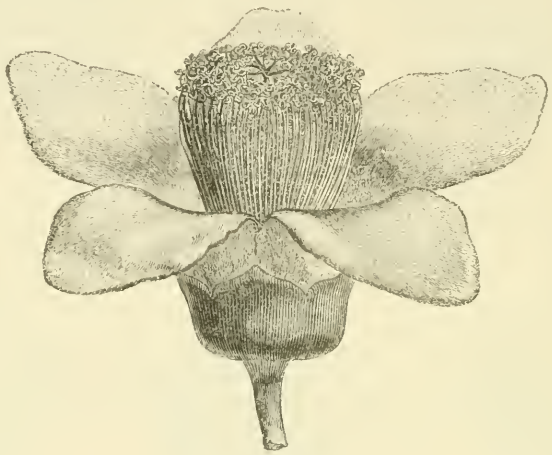

Fig. 167.
Flower ($\frac{2}{3}$).

one-celled, more or less fornicate, with lateral[1] dehiscence. The gynæceum is formed of an ovary with slightly inferior base, surmounted by a style whose stigmatiferous apex is divided into five lobes or very short branches. They correspond to the ovary cells superposed to the petals and containing in their inner angle a placenta bearing anatropous ovules arranged in several series. The fruit is a capsule, generally woody and loculicidal, separating into five valves to allow numerous seeds to escape plunged into a thick[2] wool, and enclosing under their coats a thick fleshy embryo

[1] The pollen is formed of ovoidal grains with three folds. In the water they become spherical, with three bands. Their external membrane is transparent and punctate in *B. pubescens*. It bears not very numerous pores, surrounded by a halo. (H. Mohl, in *Ann. Sc. Nat.*, sér. 2, iii. 335).

[2] "*Lana endocarpii involuta.*"

almost completely destitute of albumen,[1] and whose cotyledons are folded and rolled many times round the short straight radicle. *Bombax* consists of beautiful trees from the tropical regions. Of the

Eriodendron anfractuosum.

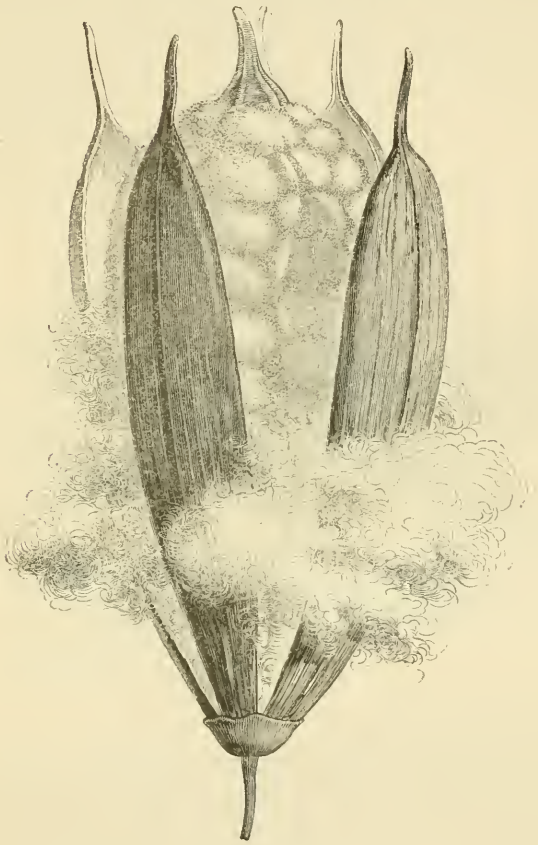

FIG. 168.
Dehiscent fruit ($\frac{2}{3}$).

ten known species[2] eight are American. The other two belong, one to Asia and the other to Africa. Their leaves are alternate compound-

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[1] Or it is, as in the Cacaos, reduced to a few mucous folds.

[2] CAV., *Diss.*, t. 154.—JACQ., *Amer.*, t. 176.—H. B. K., *Nov. Gen. et Spec.*, v. 297.—A. S. H., *Fl. Bras. Mer.*, i. 262.—MART., *Nov. Gen. et Spec.*, t. 57–59, 99.—WIGHT, *Ill.* t. 29.—PAL. BEAUV., *Fl. Ow. et Ben.*, ii. t. 83.—ROXB., *Pl. Coromand.*, iii. t. 247.—WALL., *Pl. As. Rar.*, i. t. 79, 80.—TR. et PL., in *Ann. Sc. Nat.*, sér. 4, xvii. 322.—WALP., *Rep.*, i. 329; ii. 794 (*Eriotheca*); *Ann.*, vii. 415.

digitate, with a number of folioles varying from three to nine. The flowers, solitary or united in few-flowered cymes, are axillary or terminal.

Beside *Bombax* are placed some very analogous genera. *Eriodendron* (fig. 168) has the same leaves, the same perianth, and the

Adansonia digitata.

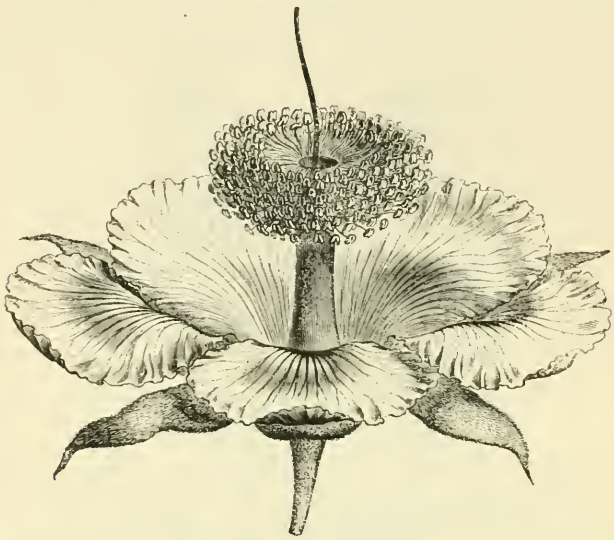

Fig. 169.
Flower ($\frac{1}{2}$).

same fruit, but the floral receptacle is much more concave, and the stamens are the same in number as the petals, with which they alternate; or they unite into bundles of two or three pieces only. Seven or eight species are known, inhabiting equally Asia, Africa, and tropical America. *Chorisia* has also the perianth and the fruit of *Bombax*, with an androceum of five bundles, but these only separate from each other at a great height, and below they form by their union a long tube round the almost entirely superior ovary. This tube is furnished on the exterior of its lower portion with five projections, which have been considered as antherless stamens; and each of the branches at its apex bears two anthers similar to those of *Eriodendron* and *Bombax*. The three known *Chorisias* are fine trees of tropical America, with the same foliage as the preceding genera.

In *Pachira* the same habit and foliage is to be observed, together with large fine flowers having an entire truncate calyx and a long thick coriaceous corolla; but the five bundles of stamens, often rather indistinct at the base, are each formed of a large number of pieces, with slender filaments and one-celled anthers, straight or simply arched. Moreover, their capsular fruit has not the seeds surrounded by the thick layer of cotton, to the centre of which they were plunged in the preceding genera. All the *Pachiras* are American. A dozen to fifteen species of them may be enumerated.

The Baobabs or *Adansonias* (figs. 169, 170) are very similar to the preceding genera, the flowers being almost the same, with a large

Adansonia digitata.

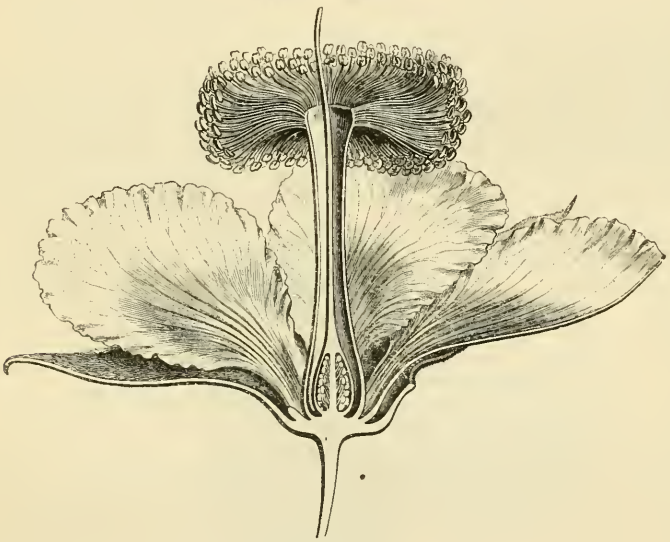

FIG. 170.
Longitudinal section of flower.

malvaceous corolla; but their calyx is quinquefid, and the fruit dry, woody, and indehiscent. The numerous seeds are enveloped in an abundant acidulous pulp, which finally dries and becomes farinaceous. The two known species of this genus, one Australian and the other widely spread in the warm regions of Asia and Africa, are trees whose trunks attain gigantic proportions in diameter, their digitate leaves having from three to nine entire folioles. The flowers are axillary and solitary, and hang from the summit of their peduncle,

which bears two lateral bractlets. All the preceding genera, analogous to this by their digitate leaves, form a subtribe of *Adansoniæ*.

Quararibea (figs. 171, 172) is the type of a subseries in which the leaves are simple, palminerved, or at least trinerved at the base.

Quararibea (Eumyrodia) turbinata.

FIG. 171.
Flower.

FIG. 172.
Long. sect. of flower.

The stamens have their filaments united into a long tube, traversed by the style. This tube remains entire in its whole extent, or it is cleft more or less deeply into five thongs in its upper part, which

Durio zibethinus.

FIG. 173.
Flower.

supports the anthers. These are one-celled and separated from each other, or they approach so as to appear like two cells of one anther (*Myrodia*), or they may even be confluent at the summit by the upper part of their clefts. The general organization of the flower, and especially of the androceum, is the same in

the very nearly related genus *Ochroma;* while in the genera *Cavanillesia, Hampea,* and *Scleronema,* the anthers bearing filaments are free, pentadelphous or polyadelphous. All these plants are American.

In Asia and tropical Oceania the series is on the contrary represented by a subseries with exceptional characters having for a type the genus *Durio* (fig. 173). The plants which constitute it have simple, entire leaves; but they are penninerved, thick and covered like the inflorescence and most of the organs with scaly hairs, sometimes very abundant. The flowers are enveloped by a gamophyllous involucre representing a valvate calyx irregularly torn at anthesis. In *Durio* it is also detached from the pedicel at its base. The calyx is a valvate sac. Within are seen five petals and very numerous stamens, monadelphous at the base, then divided into five bundles. The anthers are adnate to the connective and anfractuous. The fruit is woody, muricate, indehiscent, having seeds surrounded by a fleshy pulp and an embryo with thick cotyledons often conferruminate. *Cullenia,* related to *Durio,* has a long cylindical calyx and is destitute of corolla. *Neesia* has nearly the same perianth as *Durio;* but the stamens are free or united at the base into four or five bundles; and the apex of each filament is surmounted by one or two globose anthers, dehiscing by a sort of central pore and inserted upon a slight dilatation of this apex. *Boschia* (figs. 174, 175) has similar anthers isolated or approaching each other by twos, threes, or even more at the apex of each filament. A variable number of exterior stamens are represented by petaloid tongues similar to the real pieces of the corolla which are exterior to them. Finally, *Cœlostegia* is a plant altogether abnormal inasmuch as its small flowers, really constructed like those of *Neesia* or *Boschia,* have a concave receptacle in the form of a reversed cone. The ovary is implanted at the bottom of the cavity, but the perianth and androceum inserted upon its edges become very distinctly perigynous.

Boschia excelsa.

Fig. 174.
Flower ($\frac{3}{1}$).

Fig. 175.
Stamens ($\frac{5}{1}$).

The plants of this family have long been distinguished as constituting a natural group either on account of their aspect or their properties, or because of some prominent character, as the form of the *malvaceous* corolla, or the organization of the *columniferous* fruit. From ZALUZIAN[1] until LINNÆUS,[2] authors have made particular mention of this group. But it is necessary to refer to the *Genera* of A. L. DE JUSSIEU,[3] in order to see united in one and the same order all the representatives then known of the different series we have enumerated. These are thirty-two in the work we have just cited. But the successors of A. L. DE JUSSIEU soon divided his order *Malvaceæ* into several secondary families. VENTENAT[4] separated from it *Sterculiaceæ*, and R. BROWN[5] from *Buettneriaceæ*. In 1824 DE CANDOLLE,[6] in making these two into one, admitted *Bombaceæ*[7] as a separate family. The multiplication of these groups is carried as far as possible in the works of ENDLICHER,[8] and above all of LINDLEY.[9] But as the characters by which the three principal types of *Malvaceæ*, *Sterculiaceæ*, *Buettneriaceæ*, are distinguished from each other, are far from being constant and absolute,[10] we see

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[1] *Meth. Herb.* (1592), cl. 16. The Mallows. This class is distinguished, according to him, among others by J. BAUHIN in 1650, by JOHNSTON (in 1661), by MAGNOL, MORISON, &c.

[2] *Fragm. Meth. Nat.*, in *Cl. Plant.* (1738), Ord. XXXIV. (*Columniferi*).

[3] 271, Ord. xiv. (1789).

[4] *Malmais.*, ii. (1790), 91.

[5] In *Flind. Voy.* (1814), ii. 540; *Misc. Works* (ed. BENN.), i. 11.

[6] *Prodr.*, i. 429, 475, 481.

[7] K., *Diss. Malvac.* (1822), 5. KUNTH includes in one and the same general group, *Malvaceæ*, *Sterculiaceæ*, and *Tiliaceæ*. After which he secondarily divides *Sterculiaceæ* into series corresponding to most of those which we have enumerated.

[8] *Gen. Plant.*, 978–1012. The author divides his class L, that of *Columniferæ* into four orders, *Malvaceæ* (209), *Sterculiaceæ* (210), *Buettneriaceæ* (211), and *Jiliaceæ* (212). *Sterculiaceæ* comprise according to him *Bombaceæ* and *Helictereæ*; and he adds to *Buettneriaceæ*, *Lasiopetaleæ*, *Dombeyeæ*, *Hermannieæ*, *Eriolæneæ*, and *Philippodendreæ*.

[9] *Veg. Kingd.*, 359. The author admits also *Sterculiaceæ*, *Buettneriaceæ*, *Malvaceæ*, as distinct families, defining them as ENDLICHER has done.

[10] To abridge the examples, we see that LINDLEY characterizes *Sterculiaceæ* as "*Malval Exogens, with columnar stamens all perfect, and 2-celled anthers turned outwards;*" and that this family, moreover, includes *Matisia* and *Quararibea* with one-celled anthers properly placed in this group, because they are inseparable from the *Myrodias* with two-celled anthers; *Helicteris*, of which the anthers are sometimes those of *Myrodia*, and sometimes those of *Matisia*; *Plagianthus* and *Hoheria*, which have anthers really 1-celled; also all the *Bombaceæ*, are also constituted the same. The *Buettneriaceæ* are defined as: "*Malval Exogens, with 1-adelphous stamens, in most cases partly sterile, and 2-celled anthers turned inwards.*" This group, moreover, includes several *Lasiopetaleæ*, with extrorse anthers, almost all the *Dombeyeæ* having anthers also extrorse, as have most *Hermannieæ*, and *Buettnerieæ*, and *Philippodendron*, which is a *Plagianthus*. It may even be said, that the extrorse anthers constitute the exception in this family, such as LINDLEY defines it. I do not speak of the numerous plants destitute of staminodes which are necessarily comprised here. BENTHAM and HOOKER have, without doubt, recognised the insufficiency or the inexactitude of these various characters, for they have preserved (*Gen.*, 195, 214) but two orders, those of *Malvaceæ* and *Sterculiaceæ*, according as the anthers have one or two cells. But if such a

ourselves obliged to return to one single family, *Malvaceæ*, in distinguishing twelve series whose distinctive features are the following:—

I. Sterculieæ.—Flowers polygamous, apetalous, calyx often coloured. Stamens supported by a common central column, with extrorse anthers. Carpels independent in the flower and fruit. Seeds with or without albumen.—(5 genera.)

II. Helictereæ.—Flowers generally hermaphrodite, and with polypetalous corolla. Stamens inserted towards the summit or upon the sides of a central column below the gynæceum. Anthers extrorse, one or two-celled, all fertile, or accompanied by five staminodes. Carpels united or free, whether in the flower or fruit.—(6 genera.)

III. Dombeyeæ.—Flowers hermaphrodite, petalous. Stamens five, or arranged in five bundles with two-celled introrse anthers, often alternate with five sterile staminodes inserted under a sessile gynæceum. Seeds albuminous. Cotyledons 5-fid.—(7 genera.)

IV. Chiranthodendreæ.—Flowers hermaphrodite, apetalous. Calyx coloured. Androceum monadelphous, isostemonous; anthers two-celled extrorse. Filaments inserted under a sessile gynæceum, monadelphous in their lower part. Fruit capsular. Seeds albuminous, arillate.—(1 genus.)

V. Hermannieæ.—Flowers hermaphrodite, petalous. Androceum formed of five fertile stamens oppositipetalous with two-celled anther, and sometimes of five alternate staminodes. Gynæceum sessile or slightly stipitate, with 1–5 carpels united or free to a more or less advanced age.—(3 genera.)

VI. Buettnerieæ.—Flowers hermaphrodite. Petals generally cucullate at the base, rarely squamiform, often ligulate at the summit. Stamens fertile, solitary opposite each petal, or united by 2–∞; the bundles alternate with the alternipetalous staminodes rarely absent (and in this latter case with more than one fertile stamen within each petal). Anthers two-celled, extrorse (rarely three-celled). Ovary plurilocular. Fruit capsular or fleshy.—(12 genera.)

VII. Lasiopetaleæ.—Flowers hermaphrodite, apetalous or pro-

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distinction is generally easy to understand in practice, in trusting to it, we are exposed to placing in two different families types like the *Myrodia* and *Quararibea*, the *Kydias* and the *Helictereæ*, the *Bombaceæ* and the *Dombeyeæ*, &c.

vided with small petals, squamiform, rarely lanceolate (but in this case flat not cucullate), generally little visible. Calyx generally coloured, sometimes accrescent. Stamens fertile, oppositipetalous, generally the same in number as the petals. Anthers two-celled introrse or extrorse, dehiscing by clefts or pores. Staminodes alternipetalous, wanting or little developed. Carpels independent, or united into an ovary or into a plurilocular fruit. Seeds often arillate.—(7 genera.)

VIII. Malveæ.—Flowers naked or with epicalyx, petalous. Petals united only at their base among themselves, and with the base of a monadelphous androceum. Tube of androceum covered outwardly in its upper part as far as the apex with one-celled extrorse anthers. Carpels $1-\infty$, united in a single verticel, most generally separated from the central columella at maturity. Ovules $1-\infty$. Albumen nil or little abundant. Embryo with foliaceous cotyledons 2-plicate, or crumpled, contortuplicate.—(16 genera.)

IX. Malopeæ.—Flowers hermaphrodite. Perianth and androceum like *Malveæ*. Carpels ∞, independent, arranged without apparent order at maturity upon the common receptacle. Ovaries one-celled, with single ascending ovule. Free achenes.—(3 genera.)

X. Urreneæ.—Flowers hermaphrodite. Perianth of *Malveæ*. Column of the androceum supporting above and without, an indefinite number of stamens with one-celled anthers, truncate and quinquedentate at the summit. Carpels 5, separating from the receptacle at maturity. Styles double in number to the carpels (5 opposite the petals and 5 alternate). Seed and embryo of *Malveæ*.—(5 genera.)

XI. Hibisceæ.—Flowers hermaphrodite. Perianth of *Malveæ*. Column of androceum truncate or 5-dentate at summit very rarely covered with anthers inserted on its exterior surface. Style with branches equal in number to the ovary cells. Fruit plurilocular, not separating from the receptacle at maturity. Seed and embryo of *Malveæ*, or with thick or much contortuplicate cotyledons.—(8 genera.)

XII. Bombaceæ.—Flowers hermaphrodite, petalous. Calyx gamosepalous, irregularly dehiscing, torn, lobed or truncate, or more rarely with five deep clefts, and imbricated. Stamens often monadelphous to a variable distance, then separating into 5–10 bundles, themselves ramified and each supporting one or $2-\infty$ anthers, one-

celled reniform, anfractuous or globose, poricidal or oblong-linear. Styles single at the base, with the summit entire or with short stigmatiferous divisions equal in number to the cells. Fruit dry, dehiscent or indehiscent with carpels not separating, as a rule, from the receptacle. Embryo with thick or foliaceous cotyledons straight or crumpled, folded more or less upon themselves. Woody plants. —(16 genera.)

In 1789 the *Genera* of A. L. DE JUSSIEU,[1] resuming the work of his predecessors, enumerated in the divers groups here united under the name of *Malvaceæ*, including the *Hermannieæ*, of which he made a first section with indefinite stamens of the order *Tiliaceæ*, thirty-four of the genera which in reality belong to them. DE CANDOLLE[2] knew fifty of them in 1824, *viz.*, of *Malvaceæ* proper (ser. VIII. to XI.), *Malva*, *Althæa*, *Cristaria*, *Anoda*, *Sida*; of the *Malopeæ*, *Malope*, *Kitaibalia* and *Palava*; of the *Urenеæ*, *Urena*, *Malachra*, *Pavonia*, *Malvaviscus*; of the *Hibisceæ*, *Hibiscus*, *Thespesia*, *Gossypium* and *Fugosia*; of the *Bombaceæ*, *Helicteres*, *Quararibea* (*Myrodia*), *Plagianthus*, *Cavanillesia* (*Pourretia*), *Adansonia*, *Bombax*, *Eriodendron*, *Chorisia*, *Durio*, *Ochroma* and *Chiranthodendron* (*Cheirostemon*); of the *Sterculieæ*, *Sterculia* and *Heritiera*; of the *Buettnerieæ*, *Theobroma*, *Abroma*, *Guazuma*, *Glossostemon*, *Commersonia*, *Buettneria*, *Ayenia* and (?) *Kleinhovia*; of the *Lasiopetaleæ*, *Seringia*, *Lasiopetalum*, *Guichenotia*, *Thomasia*, *Keraudrenia*; of the *Hermannieæ*, *Melochia*, *Waltheria* and *Hermannia*; of the *Dombeyeæ*, *Ruizia*, *Pentapetes*, *Dombeya*, *Melhania*, *Trochetia*, *Pterospermum* and (?) *Kydia*; of the *Wallichieæ* (*Eriolæneæ*), *Eriolæna* (*Wallichia*). Since then it has been shown that the old genera *Abutilon* of GÆRTNER, *Modiola* of MŒNCH, and *Wissadula* of MEDIKUS may be rightly preserved as self-named. *Bastardia* of KUNTH has also been equally maintained as distinct. The genus *Sphæralcea* was established by A. ST. HILIARE;[3] *Neesia* and *Tarrietia* by BLUME;[4] *Tetradia* and *Rulingia* by R. BROWN;[5] *Gæthea* by NEES and MARTIUS;[6] *Cola* and *Ungeria* by SCHOTT;[7] *Reevesia* and *Astiria* by LINDLEY;[8] *Kosteletzkia*, by PRESL.[9]

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[1] *P.* 271-279, 289.
[2] *Prodr.*, i. 429, 475, 481.
[3] *Pl. Us. Bras.* (1826).
[4] In *Nov. Act. Nat. Cur.*, xvii., et *Bijdr.*, 227 (1825).
[5] In *Benn. Pl. Jav. Rar.* (1847), and in *Bot. Mag.*, t. 2191 (1820).
[6] In *Nov. Act. Nat. Cur.*, xi. (1823).
[7] *Melet.* (1832).
[8] In *Bot. Reg.* (1836, 1844).
[9] In *Rel. Hænk.*, ii. (1835).

The flora of Eastern India is enriched by the genera *Cullenia*[1] and *Decaschistia* due to WIGHT AND ARNOTT,[2] and, later, by the genus *Julostyles*, proposed by THWAITES.[3] KORTHALS[4] had discovered *Boschia* in the Indian Archipelago. In Australia A. CUNNINGHAM[5] made known *Hoheria*, and F. MUELLER, in his special works upon the plants of the same country, the three genera *Hamafordia*,[6] *Howittia*,[7] and *Lysiosepalum*.[8] The American flora has been recently enriched by the *Herrania* of GOUDOT,[9] the *Hampea* of SCHLECTENDAL,[10] and the *Sidalcea* of M. A. GRAY.[11] BENTHAM, in the preparation for his *Genera* of *Malvaceæ* and *Sterculiaceæ* discovered as hitherto undescribed genera *Cælostegia*, *Dicellostyes*, *Cheirolæna*[12] and *Scleronema*.[13] MASTERS has demonstrated[14] the affinities of the *Leptonychia* of TURCZANINOW[15] with the new African genus that he had just described under the name of *Scaphopetalum*.[16] Finally, last year, we made known the characters of the singular Oceanian genus *Mastersia*. Thus, besides the doubtful and imperfectly known types[17] which study must rearrange, the family, such as we define it, comprehends a total of eighty-eight genera.

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[1] WIGHT, *Icon.*, t. 1761, 1762 (1852). The type of the genus was the *Durio zeylanica* GARDN., according to the text (p. 23) of WIGHT himself.

[2] *Prodr. Fl. Pen. Ind.* (1834).

[3] *Enum. Pl. Zeyl.* (1864).

[4] *Verhand. Nat. Gesch. d. Nederl.*, 257 (1842).

[5] In *Ann. Nat. Hist.*, sér. 1, iii. (1839).

[6] *Fragm.*, ii. (1860).

[7] In *Hook. Journ.*, viii, (1856).

[8] *Fragm.*, i. (1859).

[9] In *Ann. Sc. Nat.*, sér. 3, ii. (1845).

[10] In *Linnæa*, xi. (1837).

[11] *Pl. Fendler.* (1848).

[12] *Gen.*, 207, 213, 222 (1862).

[13] In *Journ. Linn. Soc.*, vi. (1862).

[14] In *Oliv. Fl. Trop. Afr.*, i. (1868).

[15] In *Bull. Mosc.* (1858).

[16] In *B. H. Gen.*, 983 (1865).

[17] These are besides those which have been connected, not without hesitation, to some of the genera previously described :

1. *Arcynospermum* TURCZ. (in *Bull. Mosc.* (1858), i. 191), Mexican plant, of which BENTHAM & HOOKER (*Gen.*, 119) says: " Si revera est Malvacea, ad *Ureneas* pertinet ob stylos ovarii loculis 2-plo plures, sed loculi 3, 1-ovulati dicuntur et petala a columna staminea libera." (*Euphorbiaceæ ? ?*)

2. *Biasolettia* PRESL (*in Rel. Hænk.*, 141). Placed by ENDLICHER (*Gen.*, n. 5359) among the *Buettnerieæ*, in continuation of *Philippodendron* syn., according to BENTH. & J. HOOK. (*Gen.*, 217) of *Hernandia*, ought to be ranged among the *Lauraceæ* (vol. ii. p. 449, note 2).

3. *Covillhamia* KORTH. (*in Ned. Kruik. Arch.*, i. 307). This genus is considered as related to *Sterculia*, from which it differs by its 6-merous calyx and its 3-merous ovary (*Euphorbiaceæ ? ?*).

4. *Peripter* DC. (*Prodr.*, i. 459). A genus proposed for the *Sida periptera* SIMS (in *Bot. Mag.*, t. 1614;—*S. Malvaviscus* SESS. et MOÇ. —*S. rubra* TEN.;—*Anoda punicea* LAG., *Nov. Gen.*, t. 21), ought, probably, according to BENTHAM (*Gen.* 199), to be connected with the genus *Abutilon*.

5. *Ptychopyxis* MIQ. (*Fl. Ind. Bat.*, Suppl., i. 402). A plant of Sumatra, with exstipulate leaves compared to those of *Shorea*, with a capsule ("*subbaccata*") much wrinkled covered outwardly with folds and various excrescences and with a red down. Attributed doubtfully to *Sterculieæ* (B. H., *Gen.*, 217).

6. *Pyrospermum* MIQ. (*loc. cit.*). Fam. ? ?

7. *Pellostegia* (TURCZ., in *Bull. Mosc.*, (1858), i. 223, (B. H., *Gen.* 217). The characters attributed to the flower seem to be those of the *Malvaceæ;* but what is said of the seed would seem to indicate that it belongs to *Turnera*, a genus in which the vegetative characters are often those of *Malvaceæ*.

It includes about twelve hundred species,[1] of which six-tenths belong to the Old World and the rest to the New. The number of genera belonging to the latter is much less considerable than those pertaining to the former; for America has only twenty-three genera which belong to it exclusively, while the Old World has forty-eight. Consequently seventeen genera are common to both Worlds. To the Old World belong exclusively all the *Lasiopetaleæ*, *Dombeyeæ*, *Helictereæ*, except the genus *Helicteres;* to the New World the small series *Chiranthodendreæ*. Except two or three species, *Lasiopetaleæ* would even belong exclusively to Australia. *Bombaceæ*, *Helictereæ*, *Buettnerieæ*, and *Dombeyeæ* nearly all consist of plants of the tropical regions. *Hermannieæ*, *Hibisceæ*, and *Ureneæ* extend thence into the most temperate climates such as the Cape of Good Hope, Mexico, extratropical Australia, and the north of India and China. *Malveæ* and *Malopeæ*, are composed of the plants of the family found as far as the coolest regions of the globe, whether it be to the north or south of America, to the south of Australia in New Zealand (like *Hoheria* and *Plagianthus*), in Asia and Central and Northern Europe. They are, however, abundant in tropical regions since they form there, according to Humboldt, a fifth part of the vegetation[2] of the valleys. The proportion decreases considerably in the temperate zone, since there is only one-fourth as much as the preceding.[3] There is moreover here as in all the great families, types the diffusion of which is extreme: as *Hibiscus* which is found in all parts of the world, and which in America for example, occupies an area of ninety degrees in latitude. The Mallows are still more widely extended. On the contrary there are genera strictly limited to a small portion the globe, some tolerably numerous as to species like the series *Lasiopetaleæ;* others are monotypes or reduced to a very restricted number. The small series of *Chiranthodendreæ*, represented hitherto by a single genus with two sections and two species, only exists in a very restricted part of the west of North America. *Julostyles*, *Dicellostyles*,

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[1] In 1846, LINDLEY (*Veg. Kingd.*, 362, 364, 370), more than fifteen hundred were counted: 1000 for the *Malvaceæ* proper; 400 for *Buettneriaceæ;* and, 125 for *Sterculiaceæ*.

[2] LINDLEY (*Veg. Kingd.*, 369) thinks doubtless that *Sterculieæ* are comprised in this valuation.

[3] The other numbers cited in the work of

Decaschistia, Boschia, Durio, Neesia, Cœlostegia, Cullenia, Reevesia, Kleinhovia, Abroma only represented by one or two species of tropical Asia. The only *Glossostemon* known is limited to Persia; most of the *Dombeyeæ* are natives of the eastern isles of tropical Africa, and there are no *Ruizias* nor *Astirias* but in the Mascarenes islands nor probably any *Cheirolæna* but in Madagascar; in America *Theobroma, Ochroma, Cavanillesia,* and especially all the species *Herrania, Gœthea,* and *Napæa* only belong to a very restricted zone.[1]

We do not cite any absolute character for this family, for there is not a single one which really merits this name. We will only state what is to be frequently observed here: pentamerous flowers, a valvate calyx, hypogynous stamens and corolla, monadelphous and polyadelphus ovules with exterior micropyle when they are ascendent, interior when they are descendent, leaves alternate exstipulate.[2] The anatomic structure of their stems in the few where it has been studied presents also a very great many variations.[3] We shall see, moreover, presently that two of their principal properties are due to a special organization of their liber and the facility with which their parenchyma sustains the mucilaginous transformation.

Properties and uses.—The herbaceous *Malvaceæ* of our countries are known by two principal properties: Their roots, leaves, and

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M. A. De Candolle are: for Sicily, 1/86; France, 1/115; Sweden, 1/233; the temperate parts of N. America, 1/125; the regions of equinoctial America, 1/17.

[1] The only countries where, in the special works (A. DC. *Géogr. Bot.*, 1207–1230), the relation *Malvaceæ* (100) to the other phanerogamous families is found cited, are: the isles of Loo-choo and Bonin, 3; English India, 1, 5; the district of Banda, 3; the Sandwich Islands, 4; Timor, 3, 5; the Society Islands, 4; the Cape Verd Islands, 3, 5; Nubia, 6; the Mauritius, 3; Congo, 3; the Isle of St. Thomas, 5; Barbadoes, 3; the western coast of intertropical America, 3, 5; East Cape, 4, 5. The *Malvaceæ*, then, are in general from two to six times less numerous than the *Leguminosæ*, the *Graminaceæ*, the *Compositæ*, &c.

[2] The relationship with the neighbouring families has already been opportunely stated, as regards *Urticaceæ* and *Phytolaccaceæ*; it shall be so subsequently as regards *Tiliaceæ, Chlenaceæ, Geraniaceæ, Euphorbiaceæ,* &c.

[3] See Schleid., *Grundz.*, 60, 62.—Henfr., *Microsc. Dict.*, art. Wood.—Oliv., *Stem. in Dicot.*, 7. M. Schleiden (in *Wigem., Arch.*, 1839) has proved in certain *Bombaceæ* the rarity of fibrous tissue in the zones of the wood, formed almost entirely of vessels and cellular tissue. Oliver has seen in a *Sterculia* (*Delabechea rupestris*), a wood with large tubular cavities due, without doubt, to the absorption of the enormous mass of cells, and in the persistent parts, vessels and a particular parenchyma sprinkled with masses of thick elongated cells. Walpers has especially studied the wood and the bark of the *Baobabs*. Almost everything remains to be done on this question; the wood of *Stereulieæ* and *Buettnerieæ*, among others, will offer to the observer very numerous and varied subjects of research.

flowers are softening, emollient, and mucilaginous, and their bark furnishes more or less textile fibres. We shall see these characters reproduced in different degrees in most of the plants of this vast family. The first depends upon the facility with which the walls of the cells in most of the organs swell, soften, and thicken into mucilage under the influence of water, when they come in contact with it, or upon the faculty they sometimes have of producing "special cells which have their peculiar vegetation,"[1] and which represent the mucilaginous element. The Mallows have always been employed as emollients; with us especially the Great or Wild[2] Mallows (figs. 134–140), and the Little Mallow or M. with round[3] leaves. But a large number of the other species of this genus are valued in all other countries for the same purposes.[4] It is the same with the Marsh Mallow (*Guimauves*), particularly the officinal[5] M. M. (fig. 141), whose root and leaves are employed as emollients, the flowers as pectorals;[6] and the Rose Mallow,[7] whose root, less white, is also less used.[8] In warm countries *Urena*, *Sida*, and *Sphæralcea*

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[1] Trécul, The mucilage of the *Malvaceæ* (in *Adansonia*, vii. 284).

[2] *Malva sylvestris* L., *Spec.*, 969.—DC. *Prodr.*, i. 432, n. 32.—Mér. & Del., *Dict. Mat. Méd.*, iv. 207.—Guib., *Drog. Simpl.*, ed. 6, iii. 639.—A. Rich., *Elém.*, éd. 4, ii. 542, 546.—Lindl., *Veg. Kingd.*, 369; *Fl. Med.*, 142.—Endl., *Enchirid.*, 512.—Pereira, *Elem. Mat. Med.*, ed. 5, ii. p. ii. 55.—Payer, *Thèse Malvac.*, 33.—Rév., in *Fl. Med.* of the 19th century, ii. 311.—Moq., *Bot. Med.*, 181, fig. 56.—Rosenth., *Syn. Pl. Diaphor.*, 706.—H. Bn. in *Dict., Encyl. des Sc. Méd.*, sér. 2, v.—*Malva vulgaris* Ten. (vulg. *M. verte*, *Fromageon*, *Beurrat*, *Fouassier*).

[3] *M. rotundifolia* L., *Spec.*, 969.—DC., *Prodr.*, n. 34.—Guib., *loc. cit.*, 610.—A. Rich., *loc. cit.*, 547 (vulg. *M. ronde*, *Herbe de Saint-Simon*).

[4] Especially *M. nicæensis* All., *crispa* L., *Alcea* L., *italica* Poll., *fastigiata* Cav., *moschata* L., in southern Europe; *mauritiana* L., in N. Africa; *verticillata* L., in China; *borealis* L., in the N. of Europe; *balsamica* Jacq. and *fragrans* Jacq. at the Cape, &c. Guibourt has stated that at Paris *M. glabra* Desrouss., var. of *M. mauritiana* is substituted for *M. sylvestris* because of the appearance of the flowers which become blue in drying. A great many virtues, exaggerated or imaginary, have been ascribed to these plants.

[5] *Althæa officinalis* L., *Spec.*, 966.—Cav., *Diss.*, ii. 93, t. 30, fig. 2.—DC., *Prodr.*, i. 436, n. 1.—Mer. & Del., *Dict. Mat. Méd.*, i. 202.—Guib., *op. cit.*, 638, fig. 742.—Pereira, *loc. cit.*, 555.—Lindl., *Fl. Med.*, 143.—A. Rich., *Elém.*, éd. 4, ii. 543.—Payer, *Thèse Malvac.*, 35.—Moq., *Bot. Méd.*, 72, fig. 21.—Rév., in *Bot. Med.*, of the 19th century, ii. 125.—Rosenth., *op. cit.*, 705 (vulg. White Mallow).

[6] It forms part of the Syrup of *Althæa* of Fernel. It is said to have entered formerly into the preparation of the mallow paste, "*pâte de Guimauve*," and contains a crystallizable principle, called altheine, but identical with asparagine.

[7] *A. rosea* Cav., *Diss.*, ii. t. 29, fig. 3.—DC., *Prodr.*, i. 437, n. 11.—*Alcea rosea* L., *Spec.*, 966 (*Rose d'outre-mer*, *Passe-rose*, *Tremier*, *Bourdon de Saint-Jacques*). The flowers (*Flores Malvæ arboreæ s. hortensis* Off.) are used in dyeing, form a colour, an ink, and a blue lac (Rosenth., *op. cit.*, 706;—Duch., *Rep.*, 211). It is sometimes employed in adulterating several blue flowers sold in the herbalist's shop.

[8] The properties of the preceding species are found in other *Althæas* which are also used as emollients, especially *A. cannabina* L., *chinensis* Cav., *ficifolia* Cav., *taurinensis* DC., *narbonensis* Pourr., *pallida* Waldst., *meonantha* Lk., and several *Lavateras*, which we connect as a section with the same genus, viz.: *L. arborea* L. (*Spec.*, 972;—Cav., *Diss.*, ii. t. 139. fig. 2.—DC., *Prodr.*, i. 439), *trimestris* L. (*Spec.*, 974;—DC. *Prodr.*, n. 1;—*Stegia Lavatera* DC., *Fl. Fr.*, n. 4525), *thuringiaca* L. (Rosenth., *op. cit.*, 705).

hold the same place as emollients in common practice as the Marsh M. and the Mallows do with us. *Sida rhombifolia* L., *althæfolia* Lhér., *glomerata* Cav., *ovalis* Kost., in America; *S. glandulosa* Roxb.,[1] in India, are the principal herbs used for this purpose. In all the tropical regions of the globe there are *Urena lobata* Cav. and some neighbouring species; in America, *Sphæralcea cisplatina*,[2] *lactea* Spach, and *angustifolia* Spach.[3] *Malope malacoides* L., *Hibiscus vitifolius* L., *mutabilis* L., *unilateralis* Cav., *venustus* Bl., *vitifolius* L., *irriguus* Bl., *surattensis* L., *Trionum* L., *tiliaceus* L.; *Abutilon americanum* Sweet, *populifolium* Sweet, *indicum* Sweet, *hirtum* Don, *graveolens* Wight & Arn., *tomentosum* Wight & Arn., *crispum* Sweet, *umbellatum* Sweet, *mauritianum* Sweet, *atropurpureum* Kost., and many others[4] have also the same softening, emollient, pectoral virtues. They are, perhaps, still more developed in the Baobabs, whose leaves and flowers are daily used by the negroes, on account of their mucilaginous qualities, for affections of the digestive and respiratory organs. The same virtues are found also in several American *Pachiras*, in *Eriodendron*, *Helicteres*, *Ochroma*, *Guazuma*, *Kydia*, *Sterculia*. In these last the transformation of the cortical or medullary parenchyma into mucilaginous substances is spontaneous, and their bark allows a sort of gum tragacanth to ooze out. Such are *S. urens*,[5] in India, and *S. Tragacanthæ*,[6] in tropical Africa, whose produce is found now and then mixed with the gum of the Acacia, which comes from Senegambia.[7] The seeds of several *Sterculias*, when in contact with water, also develop a considerable quantity of mucilage, which has made several species valued as antiphlogistic emollients. The one most spoken of during the last few years is, without doubt, the famous *Tam-paiang*[8] of India, proposed as a specific

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[1] See Payer, *Thèse Malvac.*, 36.—Rosenth., *op. cit.*, 714.

[2] A. S. H., *Pl. Us. Bras.*, t. 52; *Fl. Bras. Mer.*, i. 209.—Lindl., *Fl. Med.*, 142 (vulg. *Malvavisco*).

[3] Rosenth., *op. cit.*, 708. It is also administered as antirheumatical.

[4] See Rosenth., *op. cit.*, 704–708.

[5] Roxb., *Pl. Coromand.*, i. 25, t. 24.—DC., *Prodr.*, i. 483, n. 23.—Rosenth., *op. cit.*, 725. —*Cavallium urens* Schott & Endl.

[6] Lindl., in *Bot. Reg.*, t. 1353.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 216.—H. Bn., in *Adansonia*, x. 173.—*S. pubescens* Don, *Gen. Syst.*, i. 615.—*S. obovata* R. Br., in *Benn. Pl. Jav. Rar.*, 233.—*Southwellia Tragacantha* Schott. —Lindl., *Fl. Med.*, 136. To this and the preceding species is attributed with some doubt the production of part of the *Kuteera* gum of commerce (Guib., *Drog. Simples*, éd. 6, iii. 452).

[7] Some similar productions are also furnished by *S. ramosa* Wall., *crinita* Cav., many *Bombaces*, &c. (see Rosenth., *op. cit.*, 722).

[8] Or *Boa-tam-pajang*, *Boochgaan-tam-paijang*, an ovoidal seed, tapering at one or both extremities, especially at that which corresponds

in diarrhœa, dysentery, quinsy, &c. It is the seed of *S. scaphigera*.[1] That of *S. alata*,[2] another Indian species, has similar properties. But the most remarkable of this group are those commonly known by the names of Cola Nut (*Noix de C.*) and the Cocoa (*Cacao*). The true Cola[3] is the seed of a *Sterculia, C. acuminata*,[4] often reduced to a large embryo more or less globose and fleshy, with three or four thick cotyledons, sometimes sold at a high price upon the western coast of tropical Africa. It is a masticatory, seeming to have properties similar to those commonly attributed to *Maté, Coca*, &c., and its flavour is at first sharp, but food, drinks, and even brackish or foul water, we are assured, seem to have an agreeable taste after eating the Cola Nut.

The ordinary Cocoa is the seed of *Theobroma Cacao* L.[5] (figs. 124–129). The pericarp[6] is cut in two and set apart under the name of *cabosse*. From it the seeds are taken, surrounded by their fleshy pulp, which is fermented either by burying them in the earth[7] or brewing them in wooden troughs. From the liquefied pulp the seeds are afterwards taken and dried upon mats: the covering of the seeds becomes coloured in the process of fermentation. The seeds contain a tannic principle, a colouring matter, an azotic crystallizable substance, theobromine,[8] and about half their weight of a solidifiable oil (Cocoa butter), which is separated by boiling in water, and variously employed as food, as an external or internal medicament, as a cosmetic, and even in the manufacture of soap and

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to the oblique hilum, 3 centim. or more in length, brownish, wrinkled, and when in contact with water developing an enormous quantity of mucilage, rich in bassorine, and containing also a greenish oil. (Guib., *op. cit.*, iii. 645.)

[1] *Scaphium scaphigerum* Schott & Endl., *Melet.*, 33.

[2] Roxb., *Pl. Coromand.*, iii. t. 287.—*Pterygota Roxburghii* Schott & Endl., *Melet.*, 32.—Rosenth., *op. cit.*, 724 (vulg. *Toola*). Its seeds are said to be narcotic, and are used in India in the same way as opium.

[3] Or *Gourou, Ngourou, Café du Soudan.*

[4] R. Br., in *Benn. Pl. Jav. Rar.*, 237.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 221.—H. Bn., in *Adansonia*, x. 169.—*Sterculia acuminata* Pal. Beauv., *Fl. Ow. et Ben.*, i. 41, t. 24.—*S. nitida* Vent., *Malmais.*, ii. 91.—*S. verticillata* Schum. & Thönn., *Beskr.*, 240.—*Siphoniopsis monoica* Karst., *Pl. Columb.*, 139, t. 69.

[5] See p. 82, note 6.—Mér. & Del., *Dict. Mat. Méd.*, vi. 719.—A. Rich., *Elém.*, éd. 4, ii. 252.—Lindl., *Fl. Med.*, 138.—Pereira, *Elem. Mat. Med.*, ed. 5, ii. p. ii. 553.—Moq., *Bot. Méd.*, 281, 405, fig. 88.—Nees, *Pl. Med.*, t. 419.—Guib., *Drog. Simpl.*, éd. 6, iii. 647, fig. 745.—Mitscherl., *d. Cacao.* Berl. (1859).—Berg. & Schm., *Off. Gew.*, iv. t. 33, e, f.—H. Bn., in *Dict. Encycl. des Sc. Méd.*, xi. 364.

[6] In this species it is yellow or red according to the varieties; elongated, attenuated into a blunt point at the two extremities with five blunt angles, and ten longitudinal ribs, but little prominent in the fresh state. In their intervals are more or less wrinkled bands obtusely tuberous.

[7] Whence the name of *C. terrés*, which is applied to the kinds called *C. de la Trinité* (from the coast of Caracas). In this case the seminal coats separate much more easily from the embryo.

[8] Bitter, little soluble, unchanged by the air, volatile above 250° ($C^{14}H^8Az^4O^4$).

wax lights. The kernels are employed principally in the manufacture of chocolate. An infusion of the shells forms a popular drink in some countries. Other species of *Theobroma* supply seeds of Cocoa for consumption. We may cite especially *T. glaucum*,[1] *bicolor*,[2] *guianense*,[3] *ovalifolium*,[4] *angustifolium*,[5] *sylvestre*,[6] *subincanum*,[7] *speciosum*,[8] *microcarpum*.[9] The *C. simarron* of Colombia is *Herrania albiflora*;[10] *C. de montagne* of the same country is *H. pulcherrima*;[11] and the Elm-leaf Cocoa of the Antilles, is *Guazuma ulmifolia*,[12] whose fruit is alimentary, mucilaginous, and astringent, and whose bark is macerated, and then used in the clarification of sugar.

Several other *Malvaceæ* have alimentary fruits. That of *Eriodendron anfractuosum*[13] (fig. 168) is eaten in India, sometimes cooked, sometimes raw. Those of the *Pachira insignis*[14] and *aquatica*[15] bear, for the same reason, the names of chestnuts of Spain and Guiana, (*Châtaignes de la côte d'Espagne* and *de la Guyane*), or of Wild Cocoa, (*Cacaos sauvages*). That of *Durio zibethinus*[16] (fig. 173) is said to be

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[1] KARST., in *Linnæa*, xxviii. 447.—ROSENTH., *op. cit.*, 726. Mr. KARSTEN says that the seeds of this species scarcely differ in taste from those of the cultivated C. and form part of the Caracas C. of commerce.

[2] H. B., *Pl. Æquin.*, i. 104, t. 30.—H. B. K., *Nov. Gen. et Spec.*, v. 317.—H. BN., in *Dict. Encycl. Sc. Méd.*, xi. 366.—*Cacao bicolor* POIR., *Dict.*, Suppl., ii. 7 (*Bacao* of New Granada). Fruit ovoidal, with ten ribs little marked from 16 to 22 centim. (about from 5½ to 7½ inches) long, said to form part of the C. of Caracas.

[3] W., *Spec.*, iii. 1422.—DC., *Prodr.*, i. 484, n. 2.—*Cacao guianensis* AUBL., *Guian.*, ii. 683, t. 275. Fruit ovoidal-rounded, with five round prickles covered with a short down 12 centim. long, 7 centim. wide, producing, we are assured, part of the C. of Cayenne.

[4] SESS. & MOÇ., *Fl. Mex. Ined.* (ex DC., *Prodr.*, n. 5).

[5] SESS. & MOÇ., *loc. cit.*—ROSENTH., *op. cit.*, 726. *C. Soconusco* and *Esmeraldas* are attributed to this and to the preceding species.

[6] *Cacao sylvestris* AUBL., *op. cit.*, 687, t. 276. Fruit obovoidal, slightly piriform at the base, with ribs almost wanting, covered with a reddish down, 14 centim. long, said to give part of the C. of Cayenne.

[7] MART., ex ROSENTH., *op. cit.*, 726.

[8] W., ex ROSENTH., *loc. cit.*

[9] MART., ex ROSENTH., *loc. cit.* These three last species produce the C. of Brazil. *C. minus* GÆRTN. (*Fruct.*, ii. 190, t. 122) is given by DE CANDOLLE as synon. with *T. Cacao* L. (See p. 82, note 5.) The principal sorts of C. not *terrés* are *Soconusco* (note 7) and those of Para, Maragnan, Martinique, and St. Domingo.

[10] GOUD., in *Ann. Sc. Nat.*, sér. 3, ii. 230, t. 5, figs. 1–10 (vulg. *Cacao montaraz* or *simarron* of New Granada). The *Quararibea Cacao* H. BN. [in *Adansonia*, x. 147;—*Myrodia Cacao* TR. & PL. (vulg. *Palo baston*)] bears also in this country the name of *C. simarron*.

[11] GOUD., *loc. cit.*, 232, t. 5, figs. 11, 12.—*H. aspera* KARST.—*Brotobroma aspera* KARST. & TR. (*C. cuadrado* or *Cahovi*).

[12] LAMK., *Dict.*, iii. 52.—*Theobroma Guazuma* L., *Spec.*, 1100.—*Bubroma Guazuma* W. (vulg. Elm of the Antilles).

[13] DC., *Prodr.*, i. 479, n. 2.—*Bombax pentandrum* L., *Spec.*, 959.—CAV., *Diss.*, v. 293, t. 151 (see RHEED., *Hort. Malab.*, iii. t. 49–51;—RUMPH., *Herb. Amboin.*, i. t. 80).

[14] *Carolinea insignis* SW., *Fl. Ind. Occ.*, ii. 1202.—DC., *Prodr.*, i. 478, n. 3.—ROSENTH., *op. cit.*, 717.—*Bombax grandiflorum* CAV., *Diss.*, v. 295, t. 154.

[15] AUBL., *Guian.*, ii. 725, t. 291, 292.—CAV., *Diss.*, iii. 176, t. 72, fig. 1.—LAMK., *Ill.*, t. 589.—*Carolinea princeps* L. F., *Suppl.*, 314.—DC., i. 478, n. 1 (*Sapoto longo*, of New Granada).

[16] L., *Syst.*, 698.—LAMK., *Ill.*, t. 641.—DC., *Prodr.*, i. 480.—ROSENTH., *op. cit.*, 720.—*Duryon* RUMPH., *Herb. Amboin.*, i. 99, t. 29 (vulg. *Hérisson d'arbre*).

much esteemed in tropical Asia.[1] In Colombia the more or less fibrous pericarp of *Sapote* and of *Castaño* is eaten, the former is *Quararibea cordata*,[2] the latter *Q. Castaño*.[3] We are assured that in India the fruit of *Heritiera littoralis* is also harvested as edible, as is also in tropical Africa the pericarp of several *Sterculias*. In *S. cordifolia*,[4] of Senegal, the edible part is considered to be the aril of the seed. In the common Boabab[5] (figs. 169, 170), it is the pulp enveloping the seeds, acid and refreshing at first, and finally dried and farinaceous, that is edible; it was formerly imported into Europe, under the name of *terre de Lemnos*. It was at that time in Greece and Egypt, as it is in our day among the negro tribes of Africa, a reputed remedy, under the name of *boüi*, for diarrhœa, dysentery, hæmoptysis, putrid fevers, &c. The exterior part of the fruit,[6] a sort of woody bark of variable form, is used like the Bottle-gourds (Fr., *Calebasses*) as vases or cisterns. Reduced to ashes they furnish an alkaline lye, which serves to saponify the rancid palm oil. The roasted seeds are used in Nubia in the preparation of a decoction as a remedy for dysentery. Those of several *Sterculias* have similar properties in their embryo, while they are also rich in tannin; consequently they are rarely edible. The kernels of *S. carthagenensis*[7] (fig. 78) are always eaten in the province of Goyaz; those of *S. fœtida*[8] in Eastern India;

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[1] The Civet-cat feeds on it, whence its specific name. This fruit passes as aphrodisiacal having, at the same time, the flavour of several fruits and vegetables and of cream. It has also the odour of the cucumber and of garlic. It appears at first fœtid and repulsive, but those who accustom themselves to it by degrees find it delicious afterwards.

[2] H. Bn., in *Adansonia*, x. 147.—*Matisia cordata* H. B., *Pl. Æquin.*, i. 10, t. 2, 3.—H. B. K., *Nov. Gen. et Spec.*, v. 307.—DC., *Prodr.*, i. 477 (*Chupa-chupa* of New Granada).

[3] H. Bn., *loc. cit.*, 146.—*Matisia Castaño* Tr. & Karst., *N. Pl. Fl. N.-Granad.*, 24; in *Linnæa* (1857), 86.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 326 (vulg. *Castaño*).

[4] Guillem. & Perr., *Fl. Seneg. Tent.*, i. 79, t. 15 (an Cav.?).—Mast., in *Oliv. Fl. Trop. Afr.*, i. 217, n. 4. In *Adansonia*, x. 173, this plant is connected with the genus *Cola* on account of the arrangement of the anthers.

[5] *Adansonia digitata* L., *Spec.*, 960.—Cav., *Diss.*, v. 298, t. 15.—Lamk., *Ill.*, t. 588.—Mér. & Del., *Dict. Mat. Méd.*, i. 72.—Guib., *Drog. Simpl.*, éd. 6, iii. 643.—Lindl., *Fl. Med.*, 139.—Rosenth., *op. cit.*, 716.—H. Bn., in *Dict. Encycl. Sc. Méd.*, i. 691.—? *Ophelus salutarius* Lour., *Fl. Cochinch.*, 501.

[6] Vulg. *Pain de singe* (*monkey bread*).

[7] Cav., *Diss.*, vi. 353.—R. Br., in *Horsf. Pl. Jav. Rar.*, 228.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 329.—*S. Helicteres* Pers., *Syn.*, ii. 240.—*S. Chicha* A. S. H., *Pl. Us. Bras.*, t. 46; *Fl. Bras. Mer.*, i. 278.—*Helicteres apetala* Jacq., *Amer.*, 238, t. 181, fig. 97 (vulg. *Chicha*, *Panama*, *Camajonduro*). The term *apetala*, adopted by Karsten, and which ought to have been employed rigorously (according to the ancient custom), is not always admissible, all the *Sterculias* being apetalous. The seeds are rich in oil, as are also those of *S. lasiantha* Mart.

[8] L., *Spec.*, 1431.—DC., *Prodr.*, i. 483, n. 27.—*Clompanus major* Rumph., *Herb. Amboin.*, iii. t. 107.

those of *S. platanifolia*[1] (figs. 85–87) in China; in America, those of *Pachira aquatica;* in the East, those of *Hibiscus ficulneus*, before maturity; in tropical Africa, those of several *Sidas*, roasted as a substitute for coffee. It is known that children eat, under the name of cheeses (Fr., *Fromageons*), the carpels of most of our indigenous Mallows. Very often the seeds of the *Malvaceæ* are principally edible on account of the oil they contain in abundance. A great deal of oil is now obtained as food for cattle, from the oleaginous embryo of the Cotton plant, which was formerly thrown away after the textile material had been removed. This embryo is now employed in the preparation of emulsions. The oil is used in Brazil, in seasoning food for man, and it is burnt for lighting purposes. The seeds of *Sterculia* furnish the natives of the Moluccas with an oil good to eat or to burn. The Nut of Malabar, whose oil also is burnt, is *S. Balanghas*[2] (figs. 79–84). The seeds of some *Sidas*, especially those of *S. hirta* L., are eaten in India as aperients and diuretics; those of *S. abutilifolia* as emollients. The seeds of *Hibiscus abelmoschus*[3] (Fr., *Ambrette*) are considered astringents and alexipharmics. They are especially valued for their perfume, their odour recalling that of musk. This plant, a native of Tropical Asia, is cultivated in most warm countries. The best seeds are said to come from Martinique. In medicine it is employed as a stimulant and antispasmodic. It is also proposed to utilize in perfumery *Palavia moschata*, also very odoriferous. The perfume of the flowers is not generally very strong among the *Malvaceæ*. The corollas of the Oceanian and Indian *Melochias*, which have numerous flowers in panicles, called also *Visenia*, have an agreeable and lively odour which can be extracted. The herbaceous organs of the *Malvaceæ* are pretty often edible, especially the leaves, the young shoots, and sometimes the roots. It is said that the ancient inhabitants of the Canary Islands lived on the roots of *Malva* and *Althæa*, scraped and cooked in milk. The shoots of the Marsh-Mallow

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[1] L., *Suppl.*, 423. — *Hibiscus simplex* L., *Spec.*, 977.—*Firmiana platanifolia* Marsigl.—R. Br., *loc. cit.*, 235.—*Culkamia* Forsk.

[2] L., *Spec.*, 1438.—DC., *Prodr.*, n. 2.—*Cavalam* Rheed., *Hort. Malab.*, i. t. 49.

[3] *Hibiscus Abelmoschus* L., *Spec.*, 980.—DC., *Prodr.*, i. 452, n. 72.—H. Bn., in *Dict. Encycl. Sc. Méd.*, i. 200.—*Abelmoschus communis* Medik.—Guib., *Drog. Simpl.*, éd. 6, iii. 640, fig. 743.—*A. moschatus* Mœnch.—Rosenth., *op. cit.*, 711.—*Granum moschatum* Rumph., *Herb. Amboin.*, iv. 40, 15 (vulg. *Fleur musquée*).

are sometimes eaten in the country, as also those of *Hibiscus grandiflorus* L., of *H. tiliaceus*, the cooked leaves of several Mallows, of *Napæa lævis* L., of *Sida rhombifolia* L., and of several others. There exists in *Hibiscus verrucosus*, *Sabdariffa* L., and several others, a certain acidity which causes the plant to be used in food, under the name of Guinea Sorrel (*Oseille de Guinée*). The *lalo* of Senegal is a particular aliment, prepared by the negroes from the dried and pulverized leaves of the Baobab. It is used daily in their food, and is at the same time a preventive remedy, inducing perspiration. It is also said to cool the blood, to prevent affections of the intestines, the loins, &c. It is the same with the *Malvaceæ* with edible flowers. In Brazil those of *Abutilon esculentum* are eaten with meat. In the Antilles and India, sauces and soups in daily use are made from buds and green fruit of the *Gombo*, that is to say, *Hibiscus esculentus*[1] or some allied[2] species. They are said to be good for repairing exhausted strength, and the same virtue in a still higher degree has been accorded to the fruit of *Durio*, esteemed in the Moluccas as a powerful aphrodisiac. In tropical countries very various curative properties are ascribed to many of the *Malvaceæ*. *Sida indica* L. is considered as stomachic and antiperiodic; *S. americana* L., *hirta* L. and *alnifolia* L., as diuretic and aperient; *S. carpinifolia* L., as emollient used topically to cure the stings of wasps, in Brazil to dissipate melancholy; *S. mauritiana* L. and *lanceolata* Retz, as tonics and febrifuges; *S. viscosa* Lhér. as emollients in the Antilles. *S. rhombifolia* derives from its properties its name of False Marsh-mallow or G. of the Indies. *Thespesia macrophylla* is considered by the Javanese as an epidermic febrifuge; the glutinous juice extracted in Tropical Asia from *T. populnea* Corr. is esteemed as a sovereign remedy for all skin affections, contusions, &c., as is also a decoction of its bark. *Pavonia odorata* W. has a root used as a febrifuge, like the *P. zeylanica* Cav., an infusion of which is employed in Ceylon. *P. diuretica* A. S. H.[3] derives its name from the use made of it in Brazil. *P. coccinea* Cav. has pretty flowers, an infusion of which is prescribed

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[1] L., *Spec.*, 980. — DC., *Prodr.*, i. 450, n. 49.—*Abelmoschus esculentus* Guillem. & Perr. (vulg. *Okra*, *Gombaut*, of the Antilles).

[2] Especially *H. longifolius* L.

[3] *Pl. Us. Bras.*, t. 53; *Fl. Bras. Mer.*, i. 234.—Rosenth., *op. cit.*, 708.

in the Antilles as antiphlogistic. *Malvaviscus arboreus* Cav. has flowers and roots used in the same country for the same purpose. Its petals are, doubtless, slightly astringent, like those of *Hibiscus Rosa sinensis*,[1] rich in tannin, employed in Otaheite in cases of ophthalmia, and used by the Chinese women to paint their eyebrows. It is also said to be used in the preparation of leather. The flowers of *H. tiliaceus* L. are aperient, like the leaves of *H. suratensis* L.,[2] which also yield a red dye. The roots of *H. Sabdariffa* L. are bitter, tonic, and aperient. Those of several Cottons are employed in India for affections of the urinary channels. *Cristaria betonicæfolia* Pers. is prescribed in Chili as refreshing and as a febrifuge. *Urena lobata* L.[3] is used in Asia in the treatment of intestinal maladies; while its flowers are employed to promote expectoration. *Helicteres Isora* L. (figs. 95, 96) is much valued in India as a tonic and stimulant, a decoction of the flowers and fruit being especially used. A juice extracted from the root is used for affections of the skin, abscesses, and cardialgia. The fruit reduced to powder and ground with castor oil is used as a remedy for affections of the ear. The thick layers of the bark of the *Guazuma ulmifolia* are employed in the Antilles as depurative and sudorific in cutaneous syphilitic affections. Several *Sterculias* and *Colas* rich in astringent qualities are similarly used in India and Tropical Africa.[4] *Waltheria americana* L. is also a febrifuge and antisyphilitic. In Brazil a decoction of *W. Douradinha* A. S. H. is prescribed for venereal maladies and affections of the chest. *Melochia corchorifolia* is reputed in India as softening and alexipharmic. Several American *Buettnerias* and *Ayenias* are used as astringents in Venezuela. *Helicteres Sacarolhæ* A. S. H.[5] is also known as astringent and antisyphilitic in Brazil. Most of the *Pterospermums* are esteemed as drugs in Tropical Asia. *P. acerifolium* W. and *glabrescens* Wight & Arn. are emollient; *P. suberifolium* Lamk. and *Heyneanum* Wall. are used in the treatment of cephalalgia. The pulverized flowers have the same effect as snuff, an infusion of them is anti-

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[1] L., *Spec.*, 977.—Cav., *Diss.*, iii. t. 69, fig. 2. — DC., *Prodr.*, n. 28. — *Flos vestiralis* Rumph., *Herb. Amboin.*, iv. 26, t. 8 (vulg. *Rose de la Chine*).

[2] L., *Spec.*, 979.—DC., *Prodr.*, n. 31.

[3] L., *Spec.*, 974.—DC., *Prodr.*, i. 441.

[4] Endl., *Enchirid.*, 517.

[5] *Pl. Us. Bras.*, t. 64; *Fl. Bras. Mer.*, i. 276 (vulg. *Sacarolha, Rosca para malas*).

blennorrhagic. *Trochetia Erythroxylon*,[1] a plant which is now said to have disappeared from the vegetation of St. Helena, was formerly used there as an emollient. The bark of *Kydia calycina* Roxb. is employed in India in sudorific and depurative infusions, and is reputed to cure elephantiasis. The seeds of *Heritiera* are bitter and tonic, and are used in dyeing. *Helicteres corylifolia* Wight has a bitter and stomachic root. In short, all the preceding species seem to act as antiphlogistics by their emollient principle, or as astringents by the tannin which they contain. The properties of certain *Bombaceæ* cannot be so described. Thus the bark of the American species of *Bombax*[2] and of some Asiatic species of the same genus, called *Salmalia*,[3] are emetic. The flowers of *B. malabaricum* DC. secrete a nectar which is purgative and diuretic. The bark of *Eriodendron anfractuosum* DC. is said to be an emetic,[4] as is also that of the root of *Ochroma Lagopus*. There are in different parts of the world more than a hundred and fifty *Malvaceæ* employed as drugs.[5]

We have spoken of their textile properties. Their liber is often tenacious, flexible, formed of separable layers, like that of the *Tiliaceæ;* consequently it is possible by maceration to separate from it thread-like substances, pretty generally employed in certain countries. But the frequent anastomoses which may be observed in the same layer of liber between the adjacent bundles, cause the bundles to be rarely separable from each other, and hinder these different *Malvaceæ* from being generally used in the manufactures. It has, however, been recommended to cultivate extensively in the marshes of Southern Europe *Hibiscus roseus*,[6] as *H. cannabinus* L. and *verrucosus* L. are cultivated in India on account of their textile liber. It would yield an abundant thread-like substance, although of inferior quality. Cords, coarse thread, bands, fishnets, and even paper are made from many of the Rose Mallows in

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[1] *Melhania Erythroxylon* Ait., *Hort. Kew.*, ed. 2, iv. 146.—DC., *Prodr.*, i. 499, n. 2.—*Dombeya Erythroxylon* Hook., in *Bot. Mag.*, t. 1000.

[2] Especially of the *B. Ceiba* L., *Spec.*, 959.—*B. quinatum* Jacq., *Amer.*, 129, t. 176, fig. 1. The *B. cumanense* H. B. K. and *septenatum* Jacq.

[3] Especially the *S. Wightii* Endl., whose fruit is also edible.

[4] Although most of its parts are emollient and mucilaginous.

[5] See Lindl., *Fl. Med.* 135–144; *Veg. Kingd.*, 361, 364, 369.—Endl., *Enchirid.*, 512, 517, 520.—Rosenth., *op. cit.*, 705, 716.

[6] Thor., in *Loisel. Fl. Gall.*, ii. 434.—DC., *Prodr.*, i. 450, n. 53.

warm countries : *H. clatus* Sw., *grandifolius* Salisb., *clypeatus* L., *syriacus* L. (figs. 154–161), *mutabilis* Cav., *vitifolius* L., *tiliaceus* L., *arboreus* L. ; the same with *Sida Abutilon* and some other *Herbes à balais*[1] (*broom herbs*) of the same genus, *Urena lobata* and *sinuata*, *Thespesia populnea*, *Napæa lævis*, *Malva Alcea*, *Althæa cannabina*, *narbonensis*, *rosea*, *Helicteres*, certain *Dombeyas* of the Mascarene Islands, *Abroma fastuosa*, several *Quararibeas*,[2] &c. But the most valuable of the textile substances which we owe to the *Malvaceæ* is Cotton, formed by certain cells of the superficial seminal coat of several species of *Gossypium*. In *G. herbaceum*[3] (figs. 163–166) in particular, at anthesis, this coat, smooth until this period, presents here and there small ribs,[4] which are due to the development of some of the cellules on their only free surface. By degrees these little conical projections, whose number continues to augment, are elongated into cylindrical cones, then into long tubes, with much attenuated walls, the cavities always being single, and only containing a kind of gas surrounded by a membrane, soon becoming dried and pressed down.[5] The long hairs are then detached more or less easily from the surface of the seeds,[6] the under portions

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[1] The branches of *S. carpinifolia* L. and *rhombifolia* L. are used in Brazil to make brooms. Those of *S. micrantha* serve to make rods of fusees, lighted at church doors on certain saints' days.

[2] Especially at Cayenne. *Q. guianensis* Aubl. (*Guian.*, t. 278 ;—*Myrodia longiflora* Sw., *Fl. Ind. Occ.*, 1229 ;—DC., *Prodr.*, i. 477, n. 3).

[3] L., *Spec.*, 975.—DC., *Prodr.*, i. 456, n. 1.—Cav., *Diss.*, t. 164, fig. 2.—A. Rich., *Elém.*, éd. 4, ii. 548.—Guib., *Drog. Simpl.*, éd. 6, iii. 642. —Rosenth., *op. cit.*, 712.— *G. hirsutum* L., *Spec.*, 975.—DC., *loc. cit.*, n. 6.—*G. prostratum* Schum. & Thönn., *Beskr.*, 311.—*G. punctatum* Guillem. & Perr., *Fl. Sen. Tent.*, i. 62. —A. Rich., *Fl. Abyss. Tent.*, i. 63 (nec Schum. & Thönn.).

[4] There is often a particular part where these ribs first appear : it was observed by us in the young seed toward the chalaza ; afterwards the eruption passed along the edges to the other end of the seed. Then, where the eruption had commenced, the prominent parts became more numerous, and were at last developed upon the two lateral surfaces of the seed. But this order in the production of the papillæ is far from being constant and absolute.

[5] It is for this reason that the reactions of the Cotton are in general those of the cells.

[6] This character serves, in the first place, to distinguish the principal species whose produce is useful. Cotton is easily detached from the seeds, and leaves them naked in *G. barbadense* L. (*Spec.*, 975 ;—DC., *loc. cit.*, n. 10 ;—Mast., *loc. cit.*, 210, n. 1 ;—H. Bn., in *Adansonia*, x. 175 ;—*G. vitifolium* Lamk., *Dict.*, ii. 135 ;—*G. peruvianum* DC., *loc. cit.*, n. 11 ;— *G. punctatum* Schum. & Thönn., *op. cit.*, 310, nec Guillem. & Perr.), a species often cultivated in Asia and Africa, and which yields different sorts of American Cottons; while in *G. anomalum* (Wawr. & Peyr., *Sert. Benguel.*, 22 ;—Mast., *loc. cit.*, 211, n. 2 ;—*G. senarense* Fenzl, in *Kotsch. It. Æthiop. Exs.*, n. 90), the only species, probably, which exists in Africa in the wild state, the filaments are only detached with difficulty, and leave upon the seed afterwards a short down, often thick and like felt. It is the same in *G. herbaceum* (p. 121, note 6) and in the *G. arboreum* (L., *Spec.*, 975 ;— DC., *loc. cit.*, n. 4 ;—Cav., *Diss.*, vi. t. 195 ;— ? *G. rubrum* Forsk., *Æg.-Arab.*, n. 88, ex DC., *loc. cit.*), which differ from the preceding, inasmuch as they have, instead of linear bracts, rare in this genus, large bracts more or less dentate, like those of *G. barbadense*. The number of useful species admitted in the genus *Gossypium* moreover varies much, according to dif-

of which are used in the way we have already indicated. The production of these filaments only takes place in the *Malvaceæ* at the surface of the seed. It can extend even to the walls of the endocarp, so that the seeds may be plunged into a down more or less analogous to cotton, but which does not adhere to their external coat, and whose development has been centripetal.[1] Such appears to be the origin of the silky filaments found in a great many *Bombaceæ*, particularly in *Bombax*, *Eriodendron*, *Chorisia*, and *Ochroma*, whose hairs are spun and woven with difficulty, but they may serve like eider down in making cushions, mattresses, &c., and have been employed in hat making, surgery, &c.[2]

When the *Malvaceæ* become trees (and they acquire an immense development in certain *Bombaceæ*, which are giants of the vegetable kingdom, like the Baobabs,[3] *Bombax*, and *Eriodendron*),[4] their wood presents two different characters, according to the genus and series to which they belong. Sometimes it is hard, enduring, and coloured, and is then used in building, as that of *Durio* and *Heritiera*, or in the manufacture of very hard objects, as that of some *Sterculias* in Africa, and that of *Pterospermum indicum* in Amboyna.[5] But generally the numerous cavities by which it is hollowed, and the re-absorption of the greater part of its parenchyma, render it soft, light, and consequently only useful for certain purposes.[6] The negroes of Senegal, among other objects,[7] make perogues, a kind of canoe, in one single

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ferent authors, BENTHAM & J. HOOKER (*Gen.*, 209, n. 39) admitting two (besides *Sturtia* and *Thurberia*); PARLATORE (*Spec. d. Coton Firenz.* (1866), c. ic.) only recognises seven. TODARO (*Oss. s. Tal. Spec. di Coton.*; 17, ex WALP., *Ann.*, vii. 409) distinguishes thirty-four, besides nine uncertain species known only by name. MASTERS (in *Oliv. Fl. Trop. Afr.*, i. 210) only preserves the species "concerning which there is little or no difference of opinion among botanists," that is to say, in this region *G. arboreum*, *herbaceum*, *anomalum*, and *barbadense*.

[1] We may with difficulty suppose an origin analogous to that of the pulp which surrounds the seeds of the Baobabs and Cacao.

[2] There has been cited *Chorisia crispiflora* K., *insignis* K., *speciosa* A. S. H. (*Arvore de poina* of the Brazilians), *Bombax Ceiba* L., *globosum* AUBL., *villosum* MILL., whose hair is red, *discolor* H. B. K., *cumanense* H. B. K., *ellipticum* H. B. K., *septenatum* JACQ., *Munguba* MART., and *retusum* MART., the *B. pubescens* MART. (*Eriotheca pubescens* MART.), the *B. jasminiodora* (*Erione jasminiodora* SCHOTT), and *Eriodendron anfractuosum*, which, according to many authors, comprises two species: *E. occidentale* (*Bombax occidentale* SPRENG.), and *E. orientale* STEUD. (see ROSENTH., *op. cit.*, 718), &c.

[3] Their diameter is often more than thirty feet, their trunk attaining twice that height.

[4] *E. Samauba* is, according to G. WALLIS, the largest tree in the world.

[5] In Madagascar the wood of several *Dombeyas* is also employed.

[6] The surface of the trunk in several species of *Bombax* and *Eriodendron* is covered with conical hard bristles. The base is often swollen into a cone like that of several Australian *Sterculias*, called for this reason *Bottle-trees*.

[7] Places of sepulchre for corpses, &c. The Baobabs are sacred or fetish trees, and are used to suspend amulets and charms.

piece, of an immense size, and of comparatively light weight from the gigantic trunks of the Baobabs. A Benin *Bombax buonopozense*[1] serves the same purpose; in India *B. Ceiba* and *B. gossypinum*, whose wood takes the place of cork;[2] on the Gambia *Eriodendron anfractuosum* and *Sterculia cordifolia;* in tropical America, various *Pachiras*. The light wood of *Hibiscus tiliaceus*[3] floats on water, and is often used in making corks or slabs to keep nets afloat. It has little solidity, but its charming colour makes it valued for cabinet-work, and it sometimes receives the name of Rose-wood. The wood of the *Ochroma Lagopus*[4] is also used as cork in America. The old trunks of the cultivated Cocoas are used in the Antilles for many useful purposes, particularly as firing.[5] We do not lay any stress upon the numerous ornamental species of *Malva, Lavatera, Callirhoe, Althæa, Sida, Hibiscus, Malope;* nor upon the beautiful Rose Mallow, such as the China Rose, the Gombauts, &c., which ornament our greenhouses, with the *Dombeyeæ* (especially *Astrapæa*), *Lasiopetala, Pentapetes, Malvaviscus, Abutilon, Pavonia, Gœthea, Gossypium, Bombax, Herrania,* and *Pachira* with large digitate leaves,[6] *Chiranthodendron* (fig. 103–105), *Sterculia, Pterospermum, Quararibea,* and numerous species of *Hermannia* (figs. 106–115) with yellowish or reddish flowers.

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[1] Pal. Beauv., *Fl. Ow. et Ben.*, ii. 42, t. 83.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 213.

[2] In Brazil *B. ventricosum* Arrud. has a wood so light that it is used for making little boards or boats, which the *Guaycurus* Indians wear in their lips or ears, and whose weight is very inconsiderable for the size of these singular ornaments.

[3] L., *Spec.*, 976.—*Paritium tiliaceum* A. Juss., in *A. S. H. Fl. Bras. Mer.*, i. 255.—*Pariti* Rheed., *Hort. Malab.*, i. t. 30.

[4] Sw., *Fl. Ind. Occ.*, ii. 1144, t. 23.—DC., *Prodr.*, i. 480.—*Bombax pyramidale* Cav., *Diss.*, v. 294, t. 155 (vulg. *Hare's-foot*, in the Antilles). The wood of *O. tomentosum* W. (vulg. *Palo de balsa*) is used in Columbia in the fabrication of light rafts which descend the Magdalena.

[5] In Madagascar the reddish extremely hard wood of the *Sterculia Tavia* H. Bn. (in *Adansonia*, x. 179) is used in making pestles to pound rice. The filamentous bark is used in making cordage.

[6] In Australia the *Sterculia acerifolia* A. Cunn. (*Brachychiton acerifolium* F. Muell.) appears to owe its ornamental qualities to its numerous fruits and bright red flowers, whence the name of *Flame-tree*.

GENERA.

I. STERCULIEÆ.

1. **Sterculia** L.—Flowers polygamous, generally 5-merous; calyx often petaloid, 5-fid or 5-partite, subcampanulate or subtubular, clavate or valvate. Corolla 0; stamens 10–∞; anthers sessile, extrorsely rimose, inserted without order at the summit of the erect column, sometimes incurved in bud. Carpels 5 (in female flowers small and sterile), opposite lobes of calyx; ovaries free 2–∞-ovulate; styles more or less joined together above, thickened stigmatiferous at apex. Fruit carpels distinct, stellate-patent, either ligneous or coriaceous, within folliculate rimose, or very thinly membranous, immediately or even before maturity dehiscing patulous. Seeds 1–∞, naked or winged; albumen fleshy, 2-parted, adhering more or less to the exterior of the cotyledons; cotyledons of thick embryo flat, or plano-convex, sometimes subundulate; radicle short, opposite hilum, nearly or partly lateral.—Trees; leaves alternate, entire, lobed or digitate; stipules usually small; flowers often in axillary, simple, or much oftener ramified racemose cymes; central flower in cymes often female and early developed (*All the Tropical and Subtropical regions of the Globe*). See p. 61.

2. **Tarrietia** Bl.—Flowers nearly of *Sterculia*, 1-sexual, 5-merous. Stamens 10–15, very much congested. Carpels 3–5, 1-ovulate, samaroid at maturity, stellate-patent, indehiscent, dorsally produced into a wide-spreading falcate wing. Seed anatropous, albumen of *Sterculia*.—Lofty trees; leaves digitate, 3–5-foliolate, glabrous or lepidote; flowers small in much ramified axillary or lateral cymiferous racemes (*Australia, Java*). See p. 64.

3. **Cola** Bauh.—Flowers nearly of *Sterculia*, 5- or more rarely 4–6-merous; staminal column bearing at summit 10–15-anthers, on simple annulate adnate series; cells parallel or superposed. Carpels 5–15, ∞-ovulate, swollen at maturity, inwardly rimose.

Seeds ∞; embryo exalbuminous; cotyledons thick; radicle near the hilum.—Trees; leaves entire or lobed; flowers polygamous in short axillary cymes; cymes sometimes disposed in compound racemes (*Tropical Africa*). See p. 64.

4. **Heritiera** Ait.—Flowers nearly of *Sterculia*, apetalous, 1-sexual; perianth campanulate, 4–5-fid or dentate; staminal column thin, dilated at base into an orbicular disk, bearing at apex a few adnate annulate anthers often 5–6; cells parallel. Stamens rudimentary or 0 in female flower. Carpels 4–6, subsessile, alternating with teeth of perianth; ovules 1 or 2 in pairs, ascending; micropyle extrorse inferior obstructed; styles short, recurved, swollen, stigmatiferous at apex. Carpels ligneous or inwardly suberous at maturity, dorsally carinate-subulate indehiscent. Seed 1; embryo exalbuminous; cotyledons very thick; radicle near hilum.—Lepidote trees; leaves alternate, entire, penninerved; flowers in axillary, sometimes much ramified cymiferous racemes (*Asia, Oriental and Insular Africa and Tropical Australia*). See p. 64.

5. **Tetradia** R. Br.—Flowers 1-sexual or polygamous, 3–4-merous apetalous (of *Sterculia*). Stamens 4–∞, in simple annulate adnate series at summit of column. Carpels 4, ∞-ovulate; styles same in number, recurved stigmatiferous at apex. Fruit ?—A tree; leaves simple, subcordate, penninerved; flowers axillary, solitary or shortly racemose (*Java*). See p. 66.

II. HELICTEREÆ.

6. **Helicteres** L.—Flowers hermaphrodite; calyx tubular or obconical, 5-fid at apex, sometimes unequal, valvate. Corolla (malvaceous); petals 5, equal or unequal, elongated into claws at base (all, or 2, 3) auriculate-appendiculate; præfloration contorted. Stamens inserted at summit of column, much elongated, exserted; antherless 5, dentiform; fertile either 5 alternate or 10 alternating in pairs; anthers stipitate or subsessile, extrorse, 2-celled; cells rimose, spreading or confluent. Gynæceum inserted at summit of the anther-column, 5-lobed; ovaries ∞-ovulate; styles 5, subulate,

more or less adherent; apex more or less swollen and stigmatiferous. Carpels separated or loosened at maturity, straight (*Orthocarpæa*) or spirally contorted (*Spirocarpæa*) inwardly dehiscent. Seeds ∞, anatropous, verruculose or rather smooth; albumen scanty; embryo rather thick, with foliaceous cotyledons, involute convolute around radicle.—Trees or shrubs; hairs stellate or ramified; leaves entire or serrate stipulate, flowers axillary solitary or in small cymes (*All the warm regions of the Globe*). See p. 66.

7. **Kleinhovia** L.—Sepals 5 valvate deciduous. Petals contorted equal or slightly unequal, inserted with calyx. Column elongated, slightly dilated at apex, bearing on both sides ∞ anthers, shortly stipitate extrorse 2-celled, and with 5 short antherless teeth alternate to anthers. Gynæceum placed at summit of column; ovary 5-celled; style thin stigmatiferous at apex, 5-fid. Ovules in each cell 4–∞, 2-seriate, ascending. Capsule membranous-inflated vesiculate, turbinate-5-lobed, loculicidal 5-valved; seeds in each cell solitary or few, globose tuberculate; embryo corrugate; cotyledons subconvolute, albumen small or 0.—A tree; leaves alternate entire, 3–7-nerved, petiolate stipulate; flowers in terminal, much ramified cymiferous racemes; bracts very small (*Trop. Asia*). See p. 68.

8. **Pterospermum** Schreb.—Sepals 5, free or tubular connate in calyx at base, valvate, deciduous. Petals contorted, inserted with calyx, deciduous. Column more or less elongated, sometimes short, slightly dilated at apex, bearing 5 elongated staminodes, and fertile stamens often 10–15 in pairs or 3 twisted together, alternately inserted; filaments linear. Anthers linear erect; connective apiculate beyond parallel cells. Ovary inserted at summit of column 3-celled; style entire clavate stigmatiferous at apex 5-sulcate. Ovules in each cell 4–∞, ascending; micropyle exterior, inferior. Capsule ligneous or more rarely coriaceous, ovoidal oblong subcylindrical or 5-gonal, loculicidal 5-valved; seeds winged above; embryo corrugate; cotyledons folded; radicle inferior, rather long; albumen small or 0.—Trees, or shrubs, lepidote or stellate-tomentose; leaves alternate (often oblique) 3–7-nerved; flowers axillary solitary or few; bracts 3 or ∞ (*Sczegleewia*) stipuliform, entire, or lacinate, inserted under the flowers (*Trop. Asia*). See p. 68.

9. ? **Eriolæna** DC.—Calyx 5-fid or 5-partite, valvate. Petals 5, alternate, inserted with calyx; claw dilated. Column short or very short, bearing ∞ 1-adelphous stamens; filaments connate into a tube to a greater or less height, unequally free at apex; anthers erect oblong-linear; cells parallel, rimose; staminodes 0. Ovary very short, stipitate, 4–12-celled; style stigmatiferous stellate at apex 4–12-lobed. Ovules ∞, ascending; micropyle extrorse inferior. Capsule lignescent, loculicidal. Seeds ∞, winged above; embryo slightly albuminous; cotyledons folded or contortuplicate; radicle inferior.—Trees, stellate-pubescent or tomentose; leaves alternate, petiolate, cordate; flowers axillary solitary or in cymes; bracts 3–5, sometimes lacinate (*Trop. Asia*). See p. 68.

10. **Reevesia** Lindl.—Calyx subclavate valvate, unequal-3–5-fid. Petals unguiculate, contorted, inserted with calyx. Column erect antheriferous at apex; anthers 10–∞, capitate; cells extrorse divaricate, rimose. Germen placed at summit of column, 5-celled; style very short, 5-lobed, stigmatiferous. Ovules 2 in each cell, ascending; micropyle extrorse inferior, capsule ligneous, loculicidal 5-valved. Seeds in cells 1, 2, ascending, winged above; embryo straight; cotyledons flat foliaceous; radicle short inferior; albumen fleshy.—Trees; leaves alternate, entire, petiolate; flowers crowded in compound terminal racemose cymes; bracts and bractlets small often remote from flower (*Tropical and Subtropical Asia*). See p. 69.

11. **Ungeria** Schott & Endl. — Calyx clavate-campanulate-valvate, 5-fid. Petals 5, inserted with calyx, unguiculate contorted. Stamens as in *Reevesia*. Germen inserted at summit of column, 5-celled; styles short, stigmatiferous at apex. "Ovule solitary in each." Capsule subulate-5-agonal, coriaceous-ligneous. "Seed ovate globose; embryo straight; albumen copious."—Trees; leaves alternate, simple, petiolate; flowers in dense cymiferous racemes; bracts small remote from flower (*Norfolk Island*). See p. 69.

III. DOMBEYEÆ.

12. **Dombeya** Cav.—Flowers hermaphrodite, usually 5-merous; calyx 5-partite, valvate, finally reflexed. Petals 5, of unequal sides, contorted, usually persistent, finally pergameneous or scarious. Stamens 15–30 (or more rarely more); filaments connate in column at base, sometimes cupuliform, sometimes elongate tubular; 5 sterile, ligulate, oppositipetalous; 10–25 fertile, alternating in pairs, or by 3–5 with the staminodes; anthers extrorse, 2-celled, 2-rimose. Ovary free; cells 5, alternipetalous, or rarely 2–4; ovules 2 in each cell, ascending; micropyle extrorse, inferior; style divided at a greater or less height into 5 branches stigmatiferous at apex. Capsule 2–5-celled, loculicidal. Seeds 1, 2, in each cell, ascending; embryo albuminous; cotyledons foliaceous, 2-partite; radicle inferior.—Shrubs or small trees; leaves alternate, stipulate, palminerved, often cordate; flowers in axillary or terminal, loose or capitate, corymbiform or umbelliferous cymes; inflorescence sometimes with bracts (*Astrapæa*) widely involucrate; bractlets 3, under each flower, unilateral, caducous, sometimes connate (*Tropical Southern continental and insular Oriental Africa, Trop. Asia ?*). See p. 69.

13. **Trochetia** DC.[1]—Flowers nearly of *Dombeya;* sepals coriaceous. Stamens fertile between the staminodes 2–∞, more rarely 5;[2] cells parallel. Ovary 3–5-celled; cells 2 or oftener ∞-ovulate; branches of style thick radiate, stigmatiferous at apex. Capsule loculicidal 5-valved; cells 2–∞-spermous.—Shrubs or small trees; leaves alternate entire coriaceous; flowers[3] axillary solitary or few (often 3), sometimes ∞, cymose, often pendulous (*St. Helena,*[4] *Tropical insular Oriental Africa*[5]).

14? **Astiria** Lindl.[6]—Flowers of *Dombeya;* stamens 20–30, all

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[1] DC., in *Mém. Mus.*, x. 106, t. 7, 8; *Prodr.*, i. 499.—Turp., in *Dict. Sc. Nat.*, Atl., t. 145.—Endl., *Gen.*, n. 5351.—B. H., *Gen.*, 222, 983, n. 17.

[2] "In spec. helenicis." (B. H.)

[3] Large, beautiful, often white or yellowish.

[4] Species 2, now said to be extinct.

[5] *Bot. Reg.* (1844), t. 21.—*Bot. Mag.*, t. 1000.—Boj., *Hort. Maur.*, 41.—H. Bn., in *Adansonia*, x. 108.—Walp., *Rep.*, v. 114.

[6] *Bot. Reg.* (1844), t. 49.—B. H., *Gen.*, 221, n. 14.

fertile; base of filaments connate in a short cupulate tube; anthers stipitate erect; cells parallel. Other characters like *Dombeya*.—A stellate-tomentose tree; leaves large cordate (of *Dombeya*); flowers[1] in compound axillary pedunculate cymes (*Borbonia*[2]).

15. **Ruizia** Cav.[3]—Flowers nearly of *Dombeya;* stamens 20–30, all fertile. Ovary sessile, 10-celled; ovules in each cell 2, ascending; micropyle extorse inferior; style branches 10, short. Ripe carpels 10, in capsule subglobose-depressed verticillate, separating at maturity and opening at central angle, 1–2-spermous.—Shrubs; leaves palminerved, subentire, lobed or dissected;[4] flowers in ramified pedunculate axillary cymes, 3-bracteolate[5] (*Mascarene Islands*[6]).

16. **Pentapetes** L.[7]—Flowers nearly of *Dombeya;* anthers between the staminodes ligulate fertile 2, 3, erect. Ovary sessile; cells ∞-ovulate; style elongate entire, stigmatiferous slightly swollen at apex. Capsule loculicidal; placentas nerviform, plumose, often separating. Seeds ∞ (of *Dombeya*).—A herb; leaves hastate, narrow at apex; flowers axillary solitary shortly pedunculate; bractlets 3, 1-lateral, caducous (*Tropical Asia*[8]).

17. **Cheirolæna** Benth.[9]—Calyx 5-partite, exterior lepidote, valvate. Petals 5, flat, wide, contorted, shortly adnate with staminal column deciduous or caducous. Stamens 15–20; exterior 10–15, fertile (of which 5 are interior longer, alternipetalous[10]); filaments adnate to the exterior of tubular column; anthers extrorse, 2-celled, 2-rimose; 5 interior oppositipetalous petaloid. Germen sessile; cells 5, alternipetalous; ovules 2–∞ in each cell, inserted at central angle, ascending; micropyle extrorse inferior; styles 5, coalescing in a central column, finally separating at a greater

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[1] Rose colour.

[2] Spec. 1. *A. rosea* Lindl., *loc. cit.*—Walp., *Rep.*, v. 113.

[3] *Diss.*, iii. 117, t. 36, 37.—J., *Gen.*, 275.—DC., *Prodr.*, i. 497.—Endl., *Gen.*, n. 5342.—B. H., *Gen.*, 221, n. 13.

[4] Underneath tomentose whitish.

[5] A genus only distinguished from *Astiria* by the number of ovary cells.

[6] Spec. 2, 3. Jacq., *Hort. Schœnbr.*, iii. 24, t. 295.—Walp., *Rep.*, ii. 797.

[7] *Gen.*, n. 834.—DC., *Prodr.*, i. 498.—Endl., *Gen.*, n. 5343.—B. H., *Gen.*, 222, n. 18.—*Moranda* Scop., *Introd.*, n. 1312.—? *Erioraphe* Miq., in *Pl. Jungh.*, i. 289.

[8] Species 1, introduced into all the warm regions of the globe. *P. phœnicea* L., *Spec.*, 958.—Mill., *Icon.*, t. 200.—Ker, in *Bot. Reg.*, t. 575.—*Dombeya phœnicea* Cav., *Diss.*, iii. t. 43, fig. 1.

[9] *Gen.*, 222, n. 16.

[10] But 5–10 shorter exterior to the preceding, either single or in pairs oppositipetalous.

or less distance from the apex, slightly dilated, stigmatiferous at apex. Capsule encircled by base of calyx, exterior lepidote, loculicidal, 5-valved; cells 1–6-spermous; seeds albuminous; embryo rather fleshy; cotyledons folded 2-partite.—Undershrubs; leaves alternate linear entire, lepidote beneath, stipules linear-subulate; flowers few (2, 3) in racemose pedunculate axillary and terminal cymes; bracts 0; epicalyx under flower of 3 bractlets, inciso-digitate or subpinnate 3-fid, constant[1] (*Madagascar*[2]).

18? **Melhania** Forsk.[3]—Flowers of *Dombeya;* stamens solitary between staminodes; filaments very shortly connate in cupule; anthers extrorse elongate; cells parallel. Ovary 5-celled; cells 1–∞-ovulate; style branches 5, patent, inwardly stigmatiferous. Other characters of *Dombeya* (or *Trochetia*). — Herbs or undershrubs, softly tomentose;[4] leaves ovate or cordate serrate-crenate; flowers axillary or lateral pedunculate, solitary or in small cymes; each furnished at base with 3 bractlets, cordate or linear, often longer than calyx, persistent[5] (*Warm regions of Asia and Africa, Tropical Australia*[6]).

IV. CHIRANTHODENDREÆ.

19. **Chiranthodendron** Larreat.—Flowers regular, apetalous; calyx (coloured) subcampanulate deeply 5-fid; lobes thick coriaceous or subpetaloid (*Fremontia*), pitted at base; præfloration imbricate. Stamens 5, alternating with the lobes of calyx; filaments

[1] For certain affinities with *Eriolæna* see Bentham.

[2] Spec. 1. *C. linearis* Benth., said to be found in the Mauritius, but all the specimens preserved by us and collected by Dupetit-Thouars, Bojer, Richard, Bernier, and Boivin are certainly Madagascarian.

[3] *Fl. Æg.-Arab.*, 64.—DC., *Prodr.*, i. 499, § 2.—Endl., *Gen.*, n. 5348.—H. Bn., in *Payer Fam. Nat.*, 288.—B. H., *Gen.*, 222, n. 19.—*Brotera* Cav., in *Ann. Cienc. Nat.*, i. 33 (part.); *Icon.*, v. 19, t. 433.—Endl., *Gen.*, n. 5344.—*Sprengelia* Schult., *Obs. Bot.*, 134.—*Pentaglottis* Wall., *Cat.*, n. 1156.—*Cardiostegia* Presl, *Epimel. Bot.*, 249.—*Vialia* Vis. (ex *Linnæa*, xv. *Littb.*, 103).

[4] Habit similar to some *Hermannias* and *Melochias*, also to *Sida* and *Hibiscus* (sect. *Senræ*).

[5] Genus scarcely distinct from *Trochetia* (on account of Greek species 5-androus).

[6] Spec. ad 15. Wall., *Pl. As. Rar.*, t. 77.—Wight, *Icon.*, t. 23.—Andr., in *Bot. Rep.*, t. 389 (*Dombeya*). — Guillem. & Perr., *Fl. Seneg. Tent.*, i. 85, t. 17.—Hook. f., *Niger*, t. 4. 5.—Harv. & Sond., *Fl. Cap.*, i. 224.—Benth., *Fl. Austral.*, i. 234.—*Bot. Mag.*, t. 100.—Walp., *Rep.*, i. 439; ii. 789; *Ann.*, i. 109; ii. 167; iv. 327; vii. 424.

connate at the base into a more or less oblique column, 5-fid; branches outwardly canaliculate, bearing cells marginally adnate distinct, extrorsely rimose; connective apiculate or muticous. Germen 5-locular; cells alternating with the stamens, ∞-ovulate; style acute stigmatiferous at apex. Capsule loculicidal 5-valved; seeds ∞; testa nitid crustaceous, marginally furnished with an aril, small, fleshy, growing between the hilum and chalaza; albumen fleshy; embryo interior; cotyledons flat; radicle short thick.—Trees or shrubs, stellate-tomentose or pubescent; leaves alternate cordate lobed stipulate; flowers pedunculate, leaf-opposed or lateral, solitary or in small cymes; bractlets 3, inserted below the flower (*Mexico, California*). See p. 72.

V. HERMANNIEÆ.

20. **Hermannia** L.—Flowers regular; receptacle slightly convex. Calyx gamosepalous, 5-fid valvate or slightly reduplicate. Petals 5 contorted marcescent or deciduous; limbs often unequal; claws hollow, filaments sometimes connate at base, oblong or dilated above, sometimes (*Mahernia*) attenuated at base, dilated at middle, exterior sometimes papillose; anthers extrorse; cells rimose to a greater or less distance, dehiscing from apex. Germen sessile or substipitate; cells 5, alternipetalous, ∞-ovulate; styles same in number, more or less coalescing at base, interior concave, apex not at all or slightly swollen stigmatiferous. Capsule loculicidal, 5-valved, naked or horny at apex; seeds ∞ reniform; embryo arched; cotyledons oblong.—Herbs, small shrubs, or undershrubs; hairs usually stellate; leaves dentate or incised; stipules foliaceous large, sometimes small or 0; flowers in simple or compound cymes, sometimes uniparous terminal, lateral, or spuriously subaxillary (*Tropical and Southern Africa, Arabia, Mexico, Texas*). See p. 74.

21. **Melochia** L.—Flowers nearly of *Hermannia;* calyx subcampanulate or inflated, sometimes finally much vesiculate (*Physodium, Physocodon*). Petals 5, sometimes marcescent. Stamens 5 oppositipetalous; anthers extrorse sometimes 10; alternipetalous

5, small dentiform. Germen sessile or shortly stipitate; cells 5 oppositipetalous, more rarely 4 or very rarely 2 (*Dicarpidium*); ovules 2 in each single cell, ascending; micropyle extrorse, inferior. Capsule loculicidal, sometimes angular pyramidal (*Eumelochia*); carpels not at all or scarcely parting, usually subglobose; carpels sometimes 2 (*Dicarpidium*) or oftener 4, 5, easily parted or separating at maturity (*Riedleia, Mougeotia*); seeds ascending, sometimes winged (*Visenia*); embryo more or less albuminous; cotyledons flat; radicle inferior.—Herbs, shrubs, or undershrubs, rarely trees; leaves subovate or cordate, entire or serrate; stipules usually small or 0; flowers lateral and spuriously axillary, connate with the branches and elevated on them for a greater or less distance, solitary or cymose, sometimes terminal, widely cymose-panicled (*Physodium, Visenia*); bracts and bractlets small or very small (*All warm regions of the Globe*). See p. 76.

22. **Waltheria** L.—Flowers nearly of *Melochia;* staminodes 0. Germen sessile 1-carpellary, 1-celled; ovules 2 ascendent; micropyle extrorse, inferior; style simple, excentric, stigmatiferous at apex, clavate, or fimbriate; capsule 1-spermous dorsally 2-valved; seeds ascendent albuminous; embryo straight (*Melochia*).—Herbs, undershrubs, or more rarely trees; hairs simple and stellate; leaves serrate; stipules narrow, flowers in axillary cymes or glomerules; cymes sometimes arranged at the summit of the branches in simple or compound spikes or racemes (*All the Tropical regions of the Globe*). See p. 77.

VI. BUETTNERIEÆ.

23. **Buettneria** Lœfl.—Flowers hermaphrodite, receptacle convex. Calyx 5-fid valvate or reduplicate. Petals 5 alternate, clawed at base, afterwards in 2-lobed cucullus, apex inflexed and margin coalescing inwardly with urceolus of stamens, dilated, upper part produced in elongated ligule, entire or 5-fid. Stamens 10, connate in urceolus at base; sterile 5 alternipetalous, thick or subglandular, apex attenuate or truncate, fertile 5 oppositipetalous, shortly stipitate; anthers articulate at base 2-celled (or more rarely 3) lateral or extrorse, longitudinally rimose. Germen superior sessile; cells 5

oppositipetalous; style stigmatiferous at apex, subentire or to a greater or less distance 5-fid or 5-lobed; ovules 2 in each cell, inserted at base of internal angle, ascendent; micropyle extrorse, inferior. Capsule subglobose echinate; carpels separating at maturity, inwardly 2-valved 1-spermous. Seeds exalbuminous; embryo rather fleshy; cotyledons reflexed at the summit of tigella, and much spirally convolute round it.—Undershrubs, erect or scandent sarmentose; branches often narrow aculeate; leaves alternate stipulate, of various forms, sometimes sagittate; flowers small in pedunculate cymes, usually umbelliferous, peduncle lateral to the leaves, connate with the branchlets, more or less elevated (*All the Tropical regions of the Globe*). See p. 78.

24? **Ayenia** L.[1]—Flowers nearly of *Buettneria;* cucullus of petals dorsally naked, or glandular stipitate enlarged. Stamens 5 solitary, sterile, between lobes of androceum; anthers 3-celled.[2] Germen, ovules, capsule and seeds nearly of *Buettneria*.—Herbs or undershrubs, hairs stellate hirsute, tomentose, or glabrescent; leaves serrate; flowers in axillary or lateral cymes[3] (*Warm America*[4]).

25. **Commersonia** Forst.[5]—Flowers nearly of *Buettneria;* base of petals wide concave, upper part ligulate. Staminodes alternipetalous, 3-fid or 3-nate, elongate; anthers fertile, 2-celled, separate. Germen 5-celled; ovules ascendent, 2–6 in each cell (or more rarely more) 2-seriate; styles distinct or coalescing to a greater or less height. Capsule loculicidal, hairs generally flaccid, echinate; seeds ascendent; embryo albuminous; cotyledons foliaceous.—Trees or shrubs, leaves often oblique at base, sometimes cordate, incised or

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[1] *Gen.*, n. 1020.—J., *Gen.*, 278.—Gærtn., *Fruct.*, i. 302, t. 79.—DC., *Prodr.*, i. 487.—Endl., *Gen.*, n. 5332.—B. H., *Gen.*, 225, n. 31. —*Dayenia* Mill., *Icon.*, t. 118.

[2] If anthers 2; one 2-celled; the other 1-celled? If anthers 3, 1-celled continent?

[3] Gen. scarcely to be distinguished (except by habit) from *Buettneria*, of which, perhaps, it would be better considered a section.

[4] Spec. 7, 8, Cav., *Diss.*, v. 289, t. 147.—Lœfl., *It.*, 200.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 333.—Walp., *Rep.*, ii. 796; *Ann.*, iv. 323; vii. 431.

[5] *Char. Gen.*, 43, t. 22.—J., *Gen.*, 428.—Gærtn., *Fruct.*, ii. 79, t. 94.—Lamk., *Ill.*, t. 18.—A. S. H., in *Ann. Sc. Nat.*, sér. 1, vi. 134.—J. Gay, in *Mem. Mus.*, x. 205, t. 14, 15. —DC., *Prodr.*, i. 486.—Spach, *Suit. à Buffon*, iii. 487.—Endl., *Gen.*, n. 5329.—B. H., *Gen.*, 226, 984, n. 34.—H. Bn., in *Payer Fam. Nat.*, 292.

dentate; flowers[1] in cymes, usually much ramified axillary, lateral, sub-leaf-opposed or more rarely terminal (*Tropical Asia and Australia*[2]).

26 ? **Rulingia** R. Br.[3]—Flowers nearly of *Commersonia;* base of petals wide concave, laterally subauriculate, above (sometimes shorty) ligulate. Staminodes 5, alternipetalous, ligulate, connivent or patent. Germen sessile; cells oppositipetalous, sometimes free at apex; styles more or less connate and coalescing; ovules 2 in each cell, ascending; micropyle extrorse and inferior. Capsule tomentose or echinate, sometimes covered with soft hairs, loculicidal, 5-valved, or carpels separating 2-valved, 1-spermous. Seeds ascendent, arillate; embryo albuminous; cotyledons flat.—Shrubs or undershrubs; hairs stellate; leaves entire, dentate or lobed; flowers[4] as in *Commersonia*[5] (*Australia*[6] *and Madagascar*[7]).

27. **Theobroma** L.—Flowers hermaphrodite; calyx 5-fid, or 5-partite valvate; petals 5, shortly unguiculate, afterwards cucullate-concave above, the cucullus inflexed, produced in spathulate laminæ with narrow base; præfloration contorted. Stamens shortly connate at base in urceolus; sterile 5 alternipetalous, linear or lanceolate; the fertile in pairs, oppositipetalous; each cell lateral, extrorsely rimose, or more rarely 3-nate; cells 6; filaments all erect, stipitate. Ovary 5-celled; cells oppositipetalous ∞-ovulate; ovules 2-seriate; styles filiform, connate to a greater or less height; apex not at all or scarcely thickened stigmatiferous. Fruit baccate, finally dry, suberose-ligneous, longitudinally 5–10-costate, indehiscent. Seeds ∞, nidulant in pulp; embryo large, rather fleshy; cotyledons thick,

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[1] Small, close.

[2] Spec. 7, 8, Rumph., *Herb. Amboin.*, iii. t. 119 (*Restiaria*)?—H. B. K., *Nov. Gen. et Spec.*, v. 311, not.—A. S. H., *Fl. Bras. Mer.*, i. 140, not.—Andr., in *Bot. Repos.*, t. 519.—Guillem., in *Ann. Sc. Nat.*, sér. 2, vii. 365.—Seem., *Fl. Vit.*, 25.—Benth., *Fl. Austral.*, i. 241.—*Bot. Mag.*, t. 1813.—Walp., *Rep.*, ii. 795; v. 110; *Ann.*, i. 107; iv. 322; vii. 433.

[3] In *Bot. Mag.*, t. 2191, 3182.—A. S. H., *Fl. Bras. Mer.*, i. 140, not.—Endl., *Gen.*, n. 5328.—H. Bn., in *Adansonia*, ix. 342.—B. H., *Gen.*, 226, 983, n. 33.—*Achilleopsis* Turcz., in *Bull. Mosc.* (1849), ii. 165.

[4] Small, often whitish.

[5] A Genus, especially by the species with short ligulate petals, closely connecting the true *Buettneriæ* with the *Lasiopetalæ*, and sometimes with difficulty distinguished from them.

[6] Spec. ad 13, J. Gay, in *Mem. Mus.*, x. t. 12, 13 (*Buettneria*).—Steetz, in *Pl. Preiss.*, ii. 352.—Endl., in *Hueg. Enum.*, 12.—Turcz., in *Bull. Mosc.* (1852), ii. 151.—F. Muell., *Fragm.*, i. 68.—Benth., *Fl. Austral.*, i. 237.—*Bot. Mag.*, t. 3182.—Walp., *Rep.*, i. 337; *Ann.*, ii. 165; vii. 432.

[7] Species 1, imperfectly known.

lobed-corrugate; radicle short, cylindrical; albumen 0, or scanty, mucilaginous between folds of cotyledons.—Trees; leaves alternate, large, simple, oblong, undivided, penninerved or at base 3–5-nerved; stipules small; flowers axillary or lateral, springing from the wood, solitary or in cymes, sometimes in racemose cymes, scanty or ∞ (*Warm America*). See p. 80.

28? **Herrania** Goud.[1]—Flowers nearly of *Theobroma;* calyx 3–5-fid; petals 5, inflexed at apex, produced in linear ligules, sometimes very long, circinate-involute before opening. Other characters of *Theobroma.* — Trees; trunk crowned with palmiform frondose coma; leaves large, digitate, foliate; inflorescence (of *Theobroma*) springing from the trunk (*Warm America*[2]).

29? **Guazuma** Plum.[3]—Flowers nearly of *Theobroma;* base of petals unguiculate-cucullate, inflexed; laminæ ligulate, linear, deep 2-fid. Stamens fertile, interposed to staminodes, 2, 3-nate. Capsule subglobose, ligneous, tuberculate-muricate, or sometimes with very long soft feathery hairs, much echinate, loculicidal at a greater or less distance from the apex, 5-valved. Seed albuminous; embryo curved; cotyledons foliaceous, inflexed-folded.—Trees, glabrous, or with stellate hairs tomentose; leaves usually oblique, unequally dentate; flowers[4] axillary or laterally cymose[5] (*Tropical America*[6]).

30. **Scaphopetalum** Mast.[7]—Calyx 5-fid, sometimes irregular, 2-partite, valvate. Petals 5, cucullate-concave, exappendiculate, subinduplicate. Stamens connate in urceolus much open, at apex 10-dentate; antherless, lobes alternipetalous, rounded, reflexed; anthers

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[1] In *Ann. Sc. Nat.*, sér. 3, ii. 230, t. 5.—B. H., *Gen.*, 225, n. 29.—H. Bn., in *Adansonia*, ix. 340. — *Brotobroma* Karst. & Tr., *Fl. Granad.*, 11 (ex *Linnæa*, xxviii. 446.)—*Lightia* Schomb. (ex Tr.).

[2] Spec. 4? Mart., in *Denkschr. Regensb. Bot. Ges.*, iii. t. 8, 9 (*Abroma*).—Schomb., in *Linnæa*, xx. 756.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 337.—Walp., *Rep.*, v. 111; *Ann.*, i. 959; vii. 430.

[3] *Gen.*, 36, t. 18.—J., *Gen.*, 276.—DC., *Prodr.*, i. 487.—Endl., *Gen.*, n. 5334.—H. Bn., in *Payer Fam. Nat.*, 291.—B. H., *Gen.*, 225, n. 30.—*Bubroma* Schreb., *Gen.*, 513.—*Diuroglossum* Turcz., in *Bull. Mosc.* (1852), ii. 157.

[4] Small, often crowded.

[5] Section of *Theobroma* (?).

[6] Spec. ad 5, Cav., *Icon.*, t. 299.—H. B. K., *Nov. Gen. et Spec.*, v. 320.—A. S. H., *Pl. Us. Bras.*, t. 47, 48; *Fl. Bras. Mer.*, i. 147.—Wight, *Ill.*, t. 31.—Pœpp. & Endl., *Nov. Gen. et Spec.*, iii. t. 283.—Griesb. *Fl. Brit. W.-Ind.*, 90.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 335.—Walp., *Rep.*, i. 340; v. 112; *Ann.*, vii. 431.

[7] In *Journ. Linn. Soc.*, x. 27.—B. H., *Gen.*, 983, n. 30 *a*.

3, sessile, oppositipetalous, 2-celled; cells separate, more or less irregularly congested,[1] extrosely rimose. Ovary sessile, 5-celled; styles connate in subulate cone, minute stigmatiferous at apex; cells ∞-ovulate.[2] Fruit?—Small trees; leaves alternate, petiolate, oblong, entire; flowers[3] in pedunculate cymes growing from the wood, sometimes very long or axillary, short (*Tropical and Western Africa*[4]).

31. **Leptonychia** Turcz.[5]—Sepals 5, reduplicate, valvate. Petals same in number, alternate, short, concave, rather thick valvate, inserted at a little height. Stamens 15–∞, connate at base in short urceolus, 5 sterile, antherless, small, interior, alternipetalous; other in 5-phalanges, oppositipetalous; 2 fertile in each; filaments elongate-subulate; anther-cells 2, extrorse, sublateral, 2-rimose; exterior to preceding 2–4 antherless. Germen free; cells 5, oppositipetalous, or more rarely 3, 4, ∞-ovulate; style slender, subulate, not swollen at apex, more or less 3–5-fid. Fruit capsular, loculicidal, 3–5-valved; seeds arillate; embryo straight; cotyledons thick foliaceous, obscurely lobed, 3-costate; albumen corneous.—Shrubs or small trees; leaves alternate, entire, penninerved, sometimes 3-nerved at base; stipules very small or very caducous; flowers[6] in short axillary cymes, often few flowered (*Tropical and Western Africa and Indian Archipelago*[7]).

32. **Abroma** Jacq.[8]—Calyx 5-partite, valvate. Petals 5; claw dilated, concave, interior wide glanduliferous, traversed by vertical prominent (coloured) lines; laminæ stipitate, sometimes spathulate, finally patent; præfloration contorted. Stamens connate in urceolus; lobes 5, antherless, alternipetalous, sometimes obcordate; anthers

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[1] Anthers 6, 1-celled (?).

[2] Ovules "amphitropous" in adult flower 1-seriate.

[3] "Bright yellow." In *L. longepedunculata* Mast., peduncles thence laden with filamentous rootlets or abortive (?) pedicels.

[4] Spec. 3, Mast., in *Oliv. Fl. Trop. Afr.*, i. 236.

[5] In *Bull. Mosc.* (1858), i. 222.—B. H., *Gen.*, 237, n. 25, 983, n. 30 *b*.—Oudem., in *Compt. Rend. Ac. Sc.*, sér. 2, i. tab.—Bocq., in *Adansonia*, vii. 35.—*Binnendykia* Kurz, in *Nat. Tijd. v. Ned. Ind.*, ser. nov., iii. 164.

[6] White.

[7] Spec. 4, of which 2 are African, Mast., in *Oliv. Fl. Trop. Afr.*, i. 238.—Walp., *Ann.*, vii. 449.

[8] *Hort. Vindob.*, iii. t. 1.—J., *Gen.*, 276.—Gærtn., *Fruct.*, i. 306, t. 64.—DC., *Prodr.*, i. 485.—Endl., *Gen.*, n. 5330.—B. H., *Gen.*, 225, 983, n. 27.—*Ambroma* L. f., *Suppl.* 341.—Lamk., *Dict.*, i. 126; *Ill.*, t. 636, 637.—*Hastingia* Kœn. (ex Endl.).

oppositipetalous, superposed between staminodes 2–4; cells 2, divaricate (one sometimes aborting). Germen sessile; cells 5, ∞-ovulate; styles 5, in tube, sometimes dilated at apex, connivent; apex stigmatiferous. Capsule membranous, wide 5-angled, subulate, truncate at apex, compressed, 5-horned, finally shortly loculicidal and septicidal[1] above. Seeds ∞; embryo albuminous straight; cotyledons flat, cordate; radicle cylindro-conical.—Many-stemmed small trees; hairs soft stellate; leaves subentire or palmilobed; flowers[2] solitary, or oftener in pedunculate cymes, terminal or sometimes spuriously leaf-opposed (*Asia and Tropical Australia*[3]).

33. **Maxwellia** H. Bn.[4]—Flowers regular; receptacle small, rather flat. Sepals 5, 3-angled, thick, reduplicate-valvate. Petals 5, alternate, small, tongue-shaped, rather fleshy, arched. Stamens 10, all fertile, oppositipetalous by pairs; filaments short, erect, 2-nate and 2-anthered at apex; anthers lateral; cells 2, separate, longitudinally laterally rimose. Germen free, elongate-fusiform, 3–5-angled; placentas same in number, parietal, inwardly rather prominent, finally inwardly contiguous or separate; ovules in each placenta ∞, 2-seriate ascending; micropyle extrorse inferior; style slender, divided at apex into 3–5-lacinate stigmatiferous lobes. Fruit clothed with base of non-accrescent calyx, oblong, subulate-3–5-angled; pericarp inwardly coriaceous-suberous. Seeds , immersed in incomplete cells, ascending; testa crustaceous; albumen copious, fleshy; embryo axile straight; cotyledons foliaceous, ellipsoidal; radicle longer below, obtuse, subclavate at apex.—A lepidote tree; leaves alternate, simple, ovate-obtuse, orbicular, or transversely elliptical, more rarely subreniform, coriaceous, thick, penninerved, 3-plinerved at base; flowers in compound racemes; branches rather compressed or angular[5] (*New Caledonia*[6]).

34. **Glossostemon** Desf.[7]—Calyx deeply 5-lobed, valvate. Petals

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[1] Dissepiments at internal angle pilose-plumose.

[2] Of a dull purple.

[3] Spec. 2, 3, R. Br., in *Ait. Hort. Kew.*, ed. 2, iv. 409.—Salisb., *Par. Lond.*, t. 102.—H. B. K., *Nov. Gen. et Spec.*, v. 318.—Benth., *Fl. Austral.*, i. 236.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 183.—Walp., *Rep.*, i. 337 (part.); *Ann.*, iv. 322; vii. 429.

[4] In *Adansonia*, x. 98.

[5] An anomalous genus, closely allied by its leaves to *Pimia*, by its minute petals to some *Lasiopetaleæ*. It differs from all in its anthers before each petal (small arched sub-transparent) not being solitary. It recedes from the rest of the *Buettnereæ* in the absence of staminodes.

[6] Spec. 1. *M. lepidota* H. Bn., *loc. cit.*, 100.

[7] In *Mém. Mus.*, iii. 238, t. 11.—DC., *Prodr.*, i, 485.—H. B. K., *Nov. Gen. et Spec.*, v.

5, concave at base, lanceolate-oblong, apex long acuminate, inflexed in bud. Stamens ∞, in 5 alternipetalous fascicles; each fascicle terminating a narrow petaloid lanceolate staminode, bearing externally ∞ (often 6) anthers, extrorse, 2-locular, 2-rimose. Germen sessile, 5-angled; styles short 5, more or less connivent or connate, stigmatiferous at apex; cells 5, oppositipetalous, ∞-ovulate. Capsule 5-celled, polyspermous, outwardly much echinate, finally loculicidally and septicidally dehiscent. Seed subpisiform, glabrous; embryo (scantily albuminous?); cotyledons foliaceous, contortuplicate. — A stellate-tomentose shrub; leaves alternate, large, palminerved, dentate; flowers[1] in terminal clusters of much ramified corymbose cymes (*Persia*[2]).

VII. LASIOPETALEÆ.

35. **Lasiopetalum** Sm.—Flowers hermaphrodite; receptacle small, slightly convex or depressed. Calyx often coloured, 5-partite or 5-fid, angular or subterete; præfloration valvate or reduplicate. Petals 5, minute, squamiform, sometimes very small or 0. Fertile stamens 5, oppositipetalous, free or at base slightly monadelphous; anthers extrorse; cells externally (or internally) subporricidal at apex or dehiscing by short clefts. Germen 5-locular; cells oppositipetalous (sometimes 3, 4-locular); ovules 2–∞ (2-seriate) ascending; micropyle extrorse, inferior; style subentire, stigmatiferous at apex. Capsule 3–5-locular, loculicidal; seeds 1–∞, ascending; micropyle sometimes arillate; embryo albuminous, straight; cotyledons flat; radicle inferior.—Shrubs, clothed with stellate hairs, sometimes dense; leaves alternate or falsely verticillate, more rarely opposite, entire, dentate, or sinuate, sometimes but rarely lobed; stipules 0 or small, assuming the appearance of leaves; flowers in false racemes, simple or ramified, cymiferous, lateral or leaf-opposed, sometimes subaxillary; cymes often 1-parous; bracts and bractlets 2, often united below flower similar to an epicalyx (*Extra-tropical Australia*). See p. 84.[3]

311, not.—Endl., *Gen.*, n. 5350.—B. H., *Gen.*, 224, n. 26.—Mast., in *Journ. Linn. Soc.*, x. 17. —H. Bn, in *Adansonia*, ix. 346.

[1] "Pink."

[2] Spec. 1, *G. Bruguieri* Desf., *loc. cit.*

[3] *Pimia* (Seem., in *Bonplandia* (1862), 366;

36. **Guichenotia** J. Gay.[1]—Flowers nearly of *Lasiopetalum*; calyx 5-fid after anthesis, membranous, dilated; sepals finally elevate-3–5-ribbed. Petals squamiform. Stamens 5, oppositipetalous; anthers dehiscing by short clefts.[2] Ovary cells 5, 2- or few-ovulate;[3] style entire, upper part bare or stellate-pilose. Capsule loculicidal. Other characters as in *Lasiopetalum*.—Small tomentose shrubs; hairs often stellate; leaves alternate, generally entire, narrow, recurved at margin; stipules? lateral, leaf-shaped; flowers solitary or in falsely racemose 1-lateral cymes[4] (*Extra-tropical Australia*[5]).

37. **Lysiosepalum** F. Muell.[6]—Sepals 5, valvate immediately before anthesis, free at base. Petals 5, minute, squamiform. Stamens 5, oppositipetalous; anthers linear, cells shortly rimose at apex. Germen 3-locular; ovules ∞; style glabrous. Capsule loculicidal, 3-valved.—A shrub, with stellate velvety hairs; leaves oblong-linear, revolute at margin; stipules small or 0; flowers[7] racemose, included in valvate involucre of thick bracts (*South Western Australia*[8]).

38. **Thomasia** J. Gay.[9]—Calyx nearly of *Lasiopetalum*; sepals coloured or transparent, finally membranous-dilated. Petals very

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Fl. Vit., 25, t. 5) is said by more recent authors (B. H., *Gen.*, 984, n. 40 *a*) to be a "Genus evidenter *Lasiopetalo* valde affine, nec nisi capsulis echinatis differre videtur." Cui: "calyx 5-fidus, laciniis obovatis obtusis. Petala minuta squamæformia cordata. Stamina antherifera 5, libera, calycis laciniis alternata; antheræ 2-rimosæ. Staminodia 0. Ovarium 5-loculare; loculis 1-ovulatis; stylo. . . Capsula sctis flaccidis echinata. Semina solitaria adscendentia.—Arbor; ramulis, foliis inflorescentiaque ferrugineo-stellato-tomentosis. Folia alterna, ovato-oblonga v. obovata, integerrima coriacea, supra demum glabrata. Cymæ paucifloræ. Spec. 1. *P. rhamnoides* Seem., ins. Fidji incola." A plant imperfectly known. In habit and number of ovules it seems to differ much from other *Lasiopetalæ*. Perhaps allied to *Maxwellia*? Its place remains very doubtful.

[1] In *Mém. Mus.*, vii. 448, t. 20.—DC., *Prodr.*, i. 489.—Endl., *Gen.* n. 5323.—B. H., *Gen.*, 227, 984, n. 39.—H. Bn., in *Adansonia*, ix. 342.—*Sarotes* Lindl., *Swan Riv. Bot. App.*, 19.— ? *Ditomostrophe* Turcz., in *Bull. Mosc.* (1846), ii. 498.

[2] Anthers appear generally extrorse; furrows slightly below apex seeking internal face, and there only dehiscing.

[3] Exostome thickened in flower.

[4] Concerning the transition from *Guichenotia* to *Sarotes* see F. Mueller (*Fragm.*, ii. 4).

[5] Spec. 5. Hook., *Journ. Bot.*, ii. 381, t. 16 (*Sarotes*).—Turcz., *loc. cit.*, 499 (*Ditomostrophe*).—Steud., in *Pl. Preiss.*, i. 233 (*Thomasia*).—F. Muell., *Fragm.*, x. 7 (*Thomasia*).—Benth., *Fl. Austral.*, i. 257.—*Bot. Mag.*, t. 4651.—Walp., *Rep.*, i. 337 (*Sarotes*); *Ann.*, i. 105; ii. 164 (*Sarotes*); iv. 321; vii. 436.

[6] *Fragm.*, i. 142.—B. H., *Gen.*, 228, 984, n. 41.

[7] "Somewhat purple."

[8] Spec. 2. Benth., *Fl. Austral.*, i. 266.—Walp., *Ann.*, vii. 437.

[9] In *Mém. Mus.*, vii. 450, t. 21, 22.—DC., *Prodr.*, i. 489.—Turp., in *Dict. Sc. Nat.*, Atl., t. 141.—Endl., *Gen.*, n. 5324.—H. Bn., in *Adansonia*, ii. 178 (*Lasiopetalum*); ix. 343.—B. H., *Gen.*, 227, 984, n. 37.—*Leucothamnus* Lindl., *Swan Riv. Bot. App.*, 19.—*Rhynchostemon* Steetz, *Pl. Preiss.*, ii. 333.— ? *Asterochiton* Turcz., in *Bull. Mosc.* (1852) ii. 138 (ex Benth.).

small or 0. Stamens 5–10; 5 sterile, small, alternipetalous or 0; fertile anthers longitudinally rimose.[1] Germen 3–5-locular; cells[2] 2–∞-ovulate; style entire. Capsule loculicidal; seeds 1 or few, ascending; embryo straight, albuminous; cotyledons flat, foliaceous. —Shrubs or undershrubs; leaves nearly of *Lasiopetalum*, generally lobed or incised; stipules small or oftener wide, resembling leaf; flowers in false racemes, cymiferous, subterminal or lateral; cymes often laterally 1-parous, few flowered; bracts and bractlets 2, often forming a kind of epicalyx under flower (*South and Western Australia*[3]).

39. **Hannafordia** F. Muell.[4]—Calyx campanulate, 5-fid, slightly dilated after anthesis; lobes acute, externally elevate-3–5-ribbed. Petals 5, shorter than calyx, lanceolate, often unequal, apex sometimes reflexed. Stamens 1-adelphous at base; 5 fertile oppositipetalous; cells elongated, parallel, extrorse, rimose; staminodes 1–4, longer, alternating, subpetaloid, subulate. Germen 3, 4-locular; 2–4 ovules in each cell, ascending; micropyle extrorse inferior; style entire, erect, stigmatiferous at apex. Capsule encircled by base of calyx, oblong, thick, ligneous, loculicidal, 3, 4-valved. Seed ascending, base furnished with laciniate (umbilical?) aril; embryo straight; cotyledons thick; radicle inferior.—A stellate, tomentose shrub; leaves alternate, subcordate, undulate-sublobed, softly tomentose, exstipulate; flowers in leaf-opposed pedunculate few cymes, shortly 5-bracteolate (*Western Australia*[5]).

40. **Seringia** J. Gay.[6]—Calyx campanulate, 5-fid at a greater or less height, tomentose, scarcely dilated after anthesis (nor coloured). Petals 0; stamens 5–10, 5 usually alternipetalous, more or less

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[1] Anthers often introrse in the bud, about anthesis versatile; clefts afterwards extrorse. Filaments in *Leucothamnus*, with very perigynous insertion. Anther of *Rhynchostemon* with connective produced beyond the cells, rostrate.

[2] Connate in plurilocular germen, or free to a greater or less height.

[3] Spec. ad 25. Labill., *Pl. Nouv.-Holl.*, i. t. 88 (*Lasiopetalum*).—Hueg., in *Endl. Dec.*, 32.—Steud., in *Pl. Preiss.*, i. 230.—Steetz, in *Pl. Preiss.*, ii. 319.—Turcz., in *Bull. Mosc.* (1846), ii. 500 (1053), ii. 142.—Spach, *Suit. à Buffon*, iii. 497.—Lindl., *Swan Riv. Bot. App.*, 18.—F. Muell., *Fragm.*, ii. 7; in *Trans. Phil. Soc. Vict.*, i. 35.—Benth., *Fl. Austral.*, i. 248.—Walp., *Rep.*, i. 336; ii. 795; v. 107; *Ann.*, i. 106; ii. 162; vii. 435.

[4] *Fragm.*, ii. 9.—B. H., *Gen.*, 227, n. 38.

[5] Spec. 1. *H. quadrivalvis* F. Muell., *loc. cit.*—Benth., *Fl. Austral.*, i. 247.—Walp., *Ann.*, 436.

[6] In *Mém. Mus.*, vii. 442, t. 16, 17.—DC., *Prodr.*, i. 488.—Endl., *Gen.*, n. 5322.—B. H., *Gen.*, 226, 984, n. 35.

squamiform or subpetaloid, sometimes connate at base; 5 oppositipetalous fertile; anthers longitudinally 2-rimose. Germen 5-locular; ovules 2 or 3 in each cell (more rarely more); styles connate or coalescing. Carpels distinct at maturity, shortly winged above, back finally gaping; seeds arillate; embryo albuminous; cotyledons foliaceous.—Shrubs;[1] leaves entire or dentate; flowers in much ramified terminal racemes of cymes (*Subtropical or Extratropical Eastern Australia*[2]).

41. **Keraudrenia** J. Gay.[3]—Flowers nearly of *Seringia;* calyx finally membranous-dilated, coloured or transparent. Petals 0 or very small, squamiform. Stamens of *Thomasia*. Germen 3–5-locular; styles coherent at apices; ovules in each cell 3–∞. Capsule 3–5-locular, membranous, villous or shortly setose, loculicidal, or carpels finally distinct. Seeds arillate; embryo albuminous, straight or curved; cotyledons flat.—Shrubs; habit and leaves of *Lasiopetalum* (or *Thomasia*); stipules small, persistent, or very small; flowers terminal, solitary, or in short cymes[4] (*Madagascar*,[5] *Extratropical and Subtropical*[6] *Australia*).

VIII. MALVEÆ.

42. **Malva** T.—Flowers hermaphrodite, regular; calyx 5-fid, valvate or subreduplicate. Petals 5, connate between themselves at base, and with the staminal column, contorted. Stamens ∞; filaments 1-adelphous at base, column tubular, afterwards divided at apex; anthers reniform, 1-locular, extrorsely rimose. Germen 8-locular; cells in a verticillate globe; 1 ovule in each cell adscendent; micro-

[1] Habit often of *Commersonia*, hence also connecting *Buettneriea* with *Lasiopetalæ*.

[2] Spec. 1. *S. platyphylla* J. Gay, *loc. cit.*—Benth., *Fl. Austral.*, i. 245.—Walp., *Ann.*, vii. n. 1.—*Lasiopetalum arborescens* Ait., *Hort. Kew.*, ed 2, ii. 36.

[3] In *Mém. Mus.*, vii. 461, t. 23.—DC., *Prodr.*, i. 489.—Endl., *Gen.*, n. 5327.—B. H., *Gen.*, 227, 984, n. 36.

[4] "Gen. quoad anther. *Seringiæ* et *Hannafordiæ* acced., calyce fere *Thomasiæ*." (B. H., *Gen.*, 984.)

[5] Spec. 1, flowers rather large, fruit hitherto not described.

[6] Spec. 6. Steud., in *Pl. Preiss.*, i. 236.—Steetz, in *Pl. Preiss.*, ii. 349 (*Seringia*).—F. Muell., *Fragm.*, i. 28, 242; ii. 5; in *Hook. Journ.*, ix. 15 (*Seringia*).—Benth., *Fl. Austral.*, i. 245.—Walp., *Ann.*, ii. 164; vii. 434.

pyle extrorse inferior, or very rarely subtransverse or descendent; micropyle introrse superior (*Malvastrum*); style branches equal in number to cells, either filiform inwardly longitudinally stigmatiferous (*Eumalva, Callirhoe*), or truncate stigmatiferous, or clavate or capitate (*Malvastrum, Phyllanthophora*) at apex. Mature carpels ∞ in depressed verticillate globe, shortly cylindrical, separating from short cylindrical or conically prominent axis, indehiscent or more rarely 2-valved, sometimes shortly spinose dorsally (*Phyllanthophora*), erostrate (*Eumalva*), or more or less long rostrate; cavity of beak sometimes separated into cells by horizontal processus (*Callirhoe*). Seeds ascendent, reniform; embryo exalbuminous or more rarely scarcely albuminous between the folds, curved; cotyledons foliaceous, more or less plicate or contortuplicate, more or less involving short inferior radicle, folded.—Herbs, sometimes suffrutescent at base; leaves alternate, usually angular, lobed or dissected, sometimes cordate or partite; stipules 2-lateral; flowers axillary, solitary, or in cymes, pedunculate or subsessile; cymes sometimes in terminal racemes; pedicels rarely petiolate, adnate to leaves of flowers (*Phyllanthophora*); involucel under flower of 3 bractlets (*Eumalva*), free, or more rarely 1, 2, small (*Malvastrum*), constant, sometimes 0 (*All Temperate regions, Warm America, Southern Africa*). See p. 86.

43. **Althæa** L.[1]—Flowers nearly of *Malva;* carpels ∞, in a depressed globe at maturity, rising above or equal to the short axis, sometimes scarcely longer than conical axis (*Olbia*[2]), or crowned with variously dilated axis (*Lavatera*[3]), rarely membranous at margin (*Alcea*[4]), finally separating at axis, indehiscent; seed and other characters of *Malva*.—Annual or perennial herbs, sometimes high tomentose (*Eualthæa*), or more rarely shrubs or trees; leaves angular, lobed, or partite; flowers[5] axillary, solitary, pedunculate, or in

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[1] L., *Gen.*, n. 839.—Adans., *Fam. des Pl.*, ii. 400.—J., *Gen.*, 272.—Gærtn., *Fruct.*, t. 136.—Lamk., *Dict.*, iii. 58; Suppl., ii. 862; *Ill.*, t. 581.—DC., *Prodr.*, i. 436.—Spach, *Suit. à Buffon*, iii. 354.—Endl., *Gen.*, n. 5270.—H. Bn., in *Payer Fam. Nat.*, 282.—B. H., *Gen.*, 200, n. 4 (incl.: *Alcea* L., *Ferberia* Scop., *Lavatera* L.).

[2] Medik., *Malv.*, 41.—*Savignonia* Webb, *Fl. Canar.*, 30, t. 13.—*Navæa* Webb, *loc. cit.*, 32, t. 1, *c.*

[3] L., *Gen.*, n. 839.—DC., *Prodr.*, i. 438.—Spach, *Suit. à Buffon*, iii. 337.—Endl., *Gen.*, n. 5269.—B. H., *Gen.*, 200, n. 5.—*Stegia* Mœnch, *Meth.*, 609.—DC., *Fl. Fr.*, iv. 583.

[4] L., *Gen.*, n. 840.—DC., *Prodr.*, i. 437.—Reichb., *Ic. Fl. Germ.*, v. 175.

[5] White, pink, somewhat purple, or very rarely pale yellow.

variously shaped terminal clusters, sometimes corymbiform; involucel under flower 3–6-fid (*Lavatera*), or 6–9-fid (*Eualthæa, Alcea*), encircling the base (*Temperate Regions of Old World, rarely Subtropical, Canary Isles, Australia*[1]).

44. **Sidalcea** A GRAY.[2]—Perianth nearly of *Malva;* calyx 5-fid. Stamens ∞, apex of column double; exterior in 5 phalanges, apex 4–∞-antheriferous; interior divided into ∞ filaments. Germen of *Malva;* cells 5–10; style branches same in number, filiform, inwardly longitudinally stigmatiferous. Mature carpels membranous, erostrate, indehiscent, separating from short axis. Seed ascendent (of *Malva*).—A herb; habit of *Malva;* leaves sometimes lobed or partite; flowers ecalyculate,[3] in spikes or terminal racemes; pedicels 0 or short (*North Western America*[4]).

45. **Napæa** L.[5]—Flowers diœcious (nearly of *Malva*) calyx 5-dentate, valvate; apex of staminal column divided into ∞ filaments. Germen 8–10-locular, style branches equal in number, inwardly longitudinally stigmatiferous. Carpels 8–10 erostrate at maturity, indehiscent or sub-2-valved, separating finally from short axis; seed ascending (of *Malva*).—Loftly perennial herbs, leaves alternate, more or less deeply partite; flowers[6] ecalyculate, in false fasciculate-umbelliferous cymes at summit of branches; cymes in large much ramified subcorymbose clusters (*North America*[7]).

46. **Sida** L.[8]—Calyx 5-dentate or 5-fid. Corolla of *Malva*. Sta-

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[1] Spec. ad 30. CAV., *Diss.*, ii., 94, 27-32.—REICHB., *Ic. Fl. Germ.*, v. t. 172-178.—GREN. & GODR., *Fl. de Fr.*, i. 292 (*Lavatera*), 294.—WALP., *Rep.*, i. 290, 291 (*Lavatera*); ii. 788 (*Lavatera*); *Ann.*, i. 98, 99; ii. 138; iv. 297; vii. 383, 386 (*Lavatera*).

[2] *Plant. Fendler*, 18; *Gen. Ill.*, t. 120.—B, H. *Gen.*, 201, n. 8.

[3] Pinkish-purple or white.

[4] Spec. 8. HOOK. & ARN., *Becch. Voy., Bot.*, t. 76 (*Sida*).—*Bot. Reg.*, t. 1036 (*Sida*).—WALP., *Ann.*, ii. 150; iv. 309.

[5] *Gen.*, n. 838.—J., *Gen.*, 273.—ENDL., *Gen.*, n. 5289 (part.).—B. H., *Gen.*, 201, n. 9.

[6] Small, white.

[7] Spec. 1. *N. scabra* L., *Syst.*, 750.—A. GRAY, *Gen. Ill.*, t. 119.—WALP., *Ann.*, ii. 151.—*Sida dioica* CAV., *Diss.*, v. 278, t. 132, fig. 2. DC., *Prodr.*, i. 466, n, 89.

[8] *Gen.* n. 837.—ADANS., *Fam. des Pl.*, ii. 398.—J., *Gen.*, 273.—LAMK., *Dict.*, i. 3; Suppl., 1, 2 (part.).—DC., *Prodr.*, i. 450.—SPACH, *Suit. à Buffon*, iii. 397.—ENDL., *Gen.*, n. 5289.—DUCHTRE, in *Ann. Sc. Nat.*, sér. 3, iv. 143.—PAYER, *Thèse Malvac.*, 17.—A. GRAY, *Gen. Ill.*, t. 123.—B. H., *Gen.*, 203, 982, n. 16.—H. BN., in *Payer Fam. Nat.*, 280.—*Stevartia* FORST., *Fl. Æg.-arab.*, 126.—*Malvinda* MEDIK., *Malv.*, 23 (ex ENDL.).

mens ∞ ; apex of column divided into filaments. Germen 5 – ∞ -locular; 1 ovule in each cell descending; micropyle introrse superior; style branches equal in number to the cells, filiform or subclavate, stigmatiferous truncate or capitate at apex. Mature carpels 5 – ∞, accompanied by fructiferous calyx, sometimes accrescent patent membranous (*Fleischeria*[1]) finally separating from the axis, sometimes membranous (*Gaya*[2]), erostrate or apex produced in rostra or erect connivent prickles, indehiscent (*Dictyocarpus*[3]), or at apex 2-valved, bare inwardly, sometimes dehiscing dorsally in 2 small valves, leaving the internal dorsal ligule ascending from the base round the seed (*Gaya*); seed descendent or sometimes subhorizontal.—Herbs, undershrubs or shrubs; indumentum often soft or tomentose; leaves entire, angular, or lobed; flowers subsessile or oftener pedunculate, solitary or in glomerules, axillary or in clusters, sometimes corymbiform, spikes or terminal capitula; bractlets 0[4] (*All warm regions of the Globe*[5]).

47. **Bastardia** H. B. K.[6]—Flowers nearly of *Sida;* germen 5-locular; cells ovulate; style branches same in number, apex capitate stigmatiferous. Capsule depressed-globose erostrate, 5-sulcate, loculicidal; valves 5, septiferous at middle; seeds descending; micropyle introrse superior.—Undershrubs or tomentose herbs;[7] leaves cordate, entire, or crenulate; flowers[8] axillary solitary, pedunculate ebracteolate (*Trop. America*[9]).

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[1] Steud., in *Pl. Preiss.*, i. 236.—Steetz, in *Pl. Preiss.*, ii. 365.

[2] H. B. K., *Nov. Gen. et Spec.*, v. 266, t. 475, 476.—Endl., *Gen.*, n. 5290.—B. H., *Gen.*, 203, n. 15.

[3] Wight, in *Madr. Journ. Sc.* (ex *Ann. Sc. Nat.*, sér. 2, xi. 169).

[4] *Malvella* Jaub. & Spach., by us (see p. 90, note 2), referred to *Malvastrum*, A. Gray (sect. *Malva*) is, on the authority of B. H. "Vera *Sidæ* species, bracteolis 2 in pedicello minimis non obstantibus." Ovules erect (Spach), and said to be suspended (B. H.). But we (in *Adansonia*, x. 188) see the ovule to be sometimes ascending (micropyle extrorse inferior), sometimes descending (micropyle introrse superior), as the insertion of the style may be more or less gynobasic. Sometimes ovules and seeds become quite transverse. Finally we hold all legitimate *Sidas* ecalyculate.

[5] Spec. ad 85. H. B. K., *Nov. Gen. et Spec.*, v. 256, t. 473.—A. S. H., *Pl. Us. Bras.*, t. 49, 50; *Fl. Bras. Mer.*, i. 173, t. 33–37, 38 (*Gaya*).—Wight, *Icon.*, t. 95.—Moric., *Pl. Nouv. Amér.*, t. 24, 25.—C. Gay, *Fl. Chil.*, i. 329.—Harv. & Sond., *Fl. Cap.*, i. 166.—Thw., *Enum. Pl. Zeyl.*, 27.—Griseb., *Fl. Brit. W.-Ind.*, 73.—A. Gray, *Pl. Fendler.*, 22.—Seem., *Fl. Vit.*, 15.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 172.—Benth., *Fl. Austral.*, i. 191.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 178.—*Bot. Mag.*, t. 2193, 2857.—Walp., *Rep.*, i. 313, 321 (*Gaya*); ii. 792; v. 93; *Ann.*, i. 102; ii. 153; iv. 310; vii. 392.

[6] *Nov. Gen. et Spec.*, v. 254, t. 472.—Endl., *Gen.*, n. 5293 (part. excl. sect. *Gayoides*).—Payer, *Thèse Malvac.*, 19.—B. H., *Gen.*, 203, n. 17.

[7] Habit of *Sida*.

[8] Yellow.

[9] Spec. 2. A. S. H., *Fl. Bras. Mer.*, i. 194, t. 39.—Griseb., *Fl. Brit. W.-Ind.*, 80.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 186.—Walp., *Ann.*, vii. 395.

48. **Anoda** Cav.[1]—Calyx 5-fid, and corolla of *Sida;* apex of staminal column divided into ∞ filaments. Germen ∞-locular; 1 ascending ovule in each cell; micropyle introrse superior; style branches equal in number to cells, filiform; apex truncate stigmatiferous, not thickened or capitate. Carpels ∞, wide stellate-verticillate, erostrate, separating from axis at maturity; laterally opened by disappearance of septa; seed ascendent or subhorizontal, more rarely subdescendent.—Glabrous or hispid herbs;[2] leaves entire hastate-3-lobed or rarely dissected; flowers[3] pedunculate, axillary, solitary, or in terminal racemes, involucel 0 (*Warm America*[4]).

49. **Cristaria** Cav.[5]—Flowers nearly of *Anoda*, ecalyculate; carpels ∞ membranous or coriaceous at maturity, apex produced in double erect connivent wings, separating from the axis, dorsally 2-valved, laterally closed or more rarely opened by disappearance of septa. Germen ∞ locular; 1 ovule in each cell descendent or subhorizontal; seeds and other characters of *Anoda*.—Herbs usually prostrate tomentose; leaves angular, lobed or dissected; flowers[6] axillary, solitary, or in terminal racemes (*South Extra-Trop. America*[7]).

50. **Hoheria** A. Cunn.[8]—Calyx cyathiform, 5 dentate valvate. Corolla of *Sida*. Staminal column 5-adelphous, apex finally divided into ∞ filaments. Germen 5-locular[9]; 1 descending ovule in each cell; micropyle introrse superior; style branches 5, filiform, peltate stigmatiferous at apex. Carpels indehiscent, dorsal wing longitudinally simply tufted, separating from axis at maturity; seed descendent or rarely subhorizontal.—A subglabrous small tree; leaves

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[1] *Diss.*, 38, t. 10, fig. 3.—J., *Gen.*, 273.—DC., *Prodr.*, i. 458.—Endl, *Gen.*, n. 5287.—Payer, *Thèse Malvac.*, 17.—A. Gray, *Gen. Ill.*, t. 124.—B. H., *Gen.*, 202, n. 13.

[2] Habit of *Malveæ*.

[3] Violet or yellow.

[4] Spec. 7, 8. Reichb., *Ic. Exot.*, t. 34.—H. B. K., *Nov. Gen. et Spec.*, v. 265.—C. Gay, *Fl. Chil.*, i. 314.—Griseb., *Fl. Brit. W.-Ind.*, 73.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 172.—*Bot. Mag.*, t. 330.—Walp., *Rep.*, i. 313; ii. 791; *Ann.*, iv. 310; vii. 391.

[5] *Icon.*, v. 10, t. 418.—DC., *Prodr.*, i. 458.—Endl., *Gen.*, n. 5288.—Payer, *Thèse Malvac.*, 19.—B. H., *Gen.*, 202, n. 14.

[6] Usually violet.

[7] Spec. ad 20. A. Gray, *Amer. Expl. Exp., Bot.*, i. 165.—Presl., *Rel. Hænk.*, ii. 119.—Cav., *Diss.*, i. t. 4, fig. 2.—Lhér., *Stirp.*, t. 57 (*Sida*).—Phil., in *Linnæa*, xxxiii. 28.—*Bot. Mag.*, t. 1673.—Walp., *Rep.*, i. 313; *Ann.*, i. 101; iv. 309; vii. 392.

[8] In *Ann. Nat. Hist.*, sér. 1. iii. 319.—Endl., *Gen.*, n. 5312.—B. H., *Gen.*, 202, n. 12.—H. Bn., in *Payer Fam. Nat.*, 283.

[9] Cells alternipetalous.

petiolate; flowers[1] axillary in fasciculate cymes; pedicels 1-flowered, articulate at middle (*New Zealand*[2]).

51. **Palgianthus** Forst.[3]—Calyx 5-dentate or 5-fid, sometimes angular (*Lawrencia*[4]), valvate. Corolla (malvaceous) often small connate with androceum at base. Stamens ∞; filaments connate at base in tubular, or urceolate column finally free; anthers (sometimes sterile) stipitate or sessile, extrorse 1, 2-locular, rimose. Carpels (in polygamous species, sometimes abortive) either solitary or 2 (*Philipodendron*,[5] *Asterotrichion*[6]), sometimes 4, 5 (*Lawrencia*, *Blepharanthemum*[7]), more rarely ∞ (*Hoherianthus*[8]); ovules (sometimes aborting) solitary in each germen, descending; micropyle introrse superior;[9] styles same in number, apex stigmatiferous filiform, or variously thickened, sometimes clavate or subcapitate, upper part inwardly longitudinally papillose. Carpels 1, 2, or 3–∞ finally separating from axis, erostrate, siccate, indehiscent, or sometimes irregularly torn, 1-spermous.—Small trees or usually shrubs, rarely herbs; leaves much varied in form entire or sinuate, angular, rarely lobed; flowers[10] solitary or in cymes; cymes axillary, with or without bracts, sometimes few in axillary racemes, more rarely (*Lawrencia*) in spikes, sometimes long terminal, bracteate (*Australia and New Zealand*[11]).

52. **Abutilon** T.[12]—Calyx 5-fid, valvate. Corolla of *Malvea*

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[1] White.

[2] Spec. 1. *H. populnea* A. Cunn., *loc. cit.*—Hook., *Icon.*, t. 565, 566.—A. Gray, *Amer. Expl. Exp., Bot.*, i. 180.—*H. angustifolia* Raoul, *Ch. de Pl. N.-Zél.*, 48, t. 26.—Hook. f., *Fl. N.-Zel.*, i. 30.

[3] *Char. Gen.*, 85, t. 43.—DC., *Prodr.*, i. 477.—Endl., *Gen.*, n. 5311.—Payer, *Organog.*, 47, t. 7.—B. H., *Gen.*, 202, 982, n. 11.—H. Bn., in *Payer Fam. Nat.*, 284.—Lem. & Dcne., *Tr. Gén.*, 348.—*Gynatrix* Alef., in *Œstr. Bot. Zeit.* (1862), 33 (ex Walp., *Ann.*, vii. 391).

[4] Hook., *Icon.*, t. 261, 417.—*Wrencelia* A. Gray, *Amer. Expl. Exp., Bot.*, 180, not.

[5] Poit., in *Ann. Sc. Nat.*, sér. 2, viii. 183, t. 3.—Endl., *Gen.*, n. 5358.—H. Bn., in *Adansonia*, ii. 179; in *Payer Fam. Nat.*, 284.—*Halothamnus* F. Muell., *Pl. Vict.*, i. 158.

[6] Kl., in *Link, Kl. et Ott. Ic. Pl.*, 19, t. 8.

[7] Kl., *loc. cit.*, 20.

[8] The type of this section is *Hoheria Lyallii* Hook. f. (*Fl. N.-Zel.*, 1, 31, t. 11). A species of *Plagianthus*, flowers ∞-gynous.

[9] Coat double.

[10] Small, usually whitish, sometimes greenish.

[11] Spec. about 10. Bonpl., *Malmais.*, t. 2 (*Sida*).—G. Don, *Gen. Syst.*, i. 501 (*Abutilon*).—Lindl., in *Bot. Reg.*, (1838), Misc., 22.—Nees, in *Pl. Preiss.*, i. 242 (*Lawrencia*).—Hook. f., *Fl. Tasm.*, i. 48 (*Laurencia*); *Handb. N.-Zeal. Fl*, 29.—Benth., in *Journ. Linn. Soc.*, vi. 101; *Fl. Austral.*, i. 187.—F. Muell., *Pl. Vict.*, i. 162.—*Bot. Mag.*, t. 2753, 3396 (*Sida*).—Walp., *Rep.*, ii. 789; v. 89 (*Laurencia*); vii. 390.

[12] *Inst.*, 99 (part.).—Gærtn., *Fruct.*, ii. 251, t. 135.—Endl., *Gen.*, n. 5292.—Duchtre, in *Ann. Sc. Nat.*, sér. 3, iv., 137.—Payer, *Thèse Malvac.*, 4, 23.—A. Gray, *Gen. Ill.*, t. 125.—B. H., *Gen.*, 204, 982, n. 21.—H. Bn., in *Payer Fam. Nat.*, 280.—*Abutilea* F. Muell., in *Linnæa*, xxv. 379.

Stamens ∞ ; column divided into filaments at apex. Germen 5–∞-locular; cells verticillate, 3–8-ovulate; style branches equal in number to the cells, filiform or shortly decurrent-clavate, stigmatiferous at apex (*Sidabutilon*[1]). Carpels 3–8, coalescing at base when mature or quite separating, sometimes membranous-dilated, apex rotund, long dependent from central column (by means of a free nerve) (*Gayoides*[2]), upper part rotund divergent-rostrate, 2-valved, interior naked; seeds 1–∞, subreniform often oblique; superior ascendent; inferior, horizontal, or oftener descendent.—Herbs, shrubs, or more rarely trees; tomentum usually soft; leaves generally cordate, angular, or lobed, rarely narrow; flowers usually axillary, without epicalyx (*All warm regions*[3]). See p. 91.

53? **Wissadula** MEDIK.[4]—Flowers of *Abutilon;* ovary cells 5; ovules 1–4; style branches same in number, capitate stigmatiferous at apex. Fruit (truncate at apex), carpels 5, membranous at maturity; apex extrorse angular, or rostrate (rostra divergent) by transverse lamellæ or ribs more or less septate within, dehiscing in two valves; upper part of carpel sometimes aspermous. Seeds 1–4, of which 1, 2 in lower part of cells are descendent, and 1, 2 or more rarely 0 in upper part ascendent.—Shrubs, usually tomentose; leaves cordate, entire or dentate; flowers[5] axillary or in racemes at summit of branches (rarely subspikes), sometimes interrupted, simple or ramified, ecalyculate; peduncles 1–∞-flowered[6] (*Trop. America, Asia and Africa*[7]).

[1] Species including a few S. American, especially *Sida vitifolia* CAV., which is *A. vitifolium* LINDL. [*Bot. Reg.* (1844), t. 57.]

[2] ENDL., *Gen.* n. 5293 b (sect. *Bastardiæ*).—*Gayopsis* A. GRAY, *Gen. Ill.*, ii. 167, t. 126.—*Beloere* SHUTT., in *Pl. Rueg. exs.*

[3] Spec. ad 70. H. B. K., *Nov. Gen. et Spec.*, v. 256, t. 473.—DC., *Prodr.*, i. 467 (*Sida*).—A. S. H., *Pl. Us. Bras.*, t. 51; *Fl. Bras. Mer.*, i. t. 39 (*Bastardia*), 196, t. 40–42.—WIGHT, *Icon.*, t. 12, 68.—GUILLEM. & PERR., *Fl. Sen. Tent.*, i. 14.—C. GAY, *Fl. Chil.*, i. 330.—HARV. & SOND., *Fl. Cap.*, i. 168.—GRISEB., *Fl. Brit. W.-Ind.*, 77.—A. GRAY, *Man.*, ed. 5, 67.—TR. & PL., in *Ann. Sc. Nat.*, sér. 4, xvii. 182.—BENTH., *Fl. Austral.*, i. 191.—MAST., in *Oliv. Fl. Trop. Afr.*, i. 183.—*Bot. Mag.*, t. 2759, 2821, 3150, 3840, 3892, 4134, 4170, 4227, 4360, 4463 (*Sida*).—WALP., *Rep.*, i. 322; ii. 793; v. 95; *Ann.*, i. 104; ii. 157; iv. 313; vii. 392.

[4] *Malv.*, 25.—PRESL, *Reliq. Hænk.*, ii. 117, t. 69.—ENDL., *Gen.*, n. 5295.—PAYER, *Thèse Malvac.*, 5, 6, 22.—B. H., *Gen.*, 204, n. 20.

[5] Rather small, yellow.

[6] A genus scarcely distinct from the *Abutilons* with transverse carpels; much better as a section of them.

[7] Spec. ad 5. CAV., *Diss.*, i. t. 5, fig. 1, 2.—LHÉR., *Stirp.*, t. 58 (*Sida*).—TURCZ., in *Bull. Mosc.* (1858), i. 102.—GRISEB., *Fl. Brit. W.-Ind.*, 77 (*Sidæ* sect. *Wissida*).—THW., *Enum. Pl. Zeyl.*, 27.—TR. & PL., in *Ann. Sc. Nat.*, sér. 4, xvii. 186.—WALP., *Rep.*, i. 327; *Ann.*, vii. 395.

54. **Sphæralcea** A. S. H.[1]—Flowers nearly of *Abutilon;* ovary cells ∞, 2_3-ovulate; disk hypogynous, sometimes smooth, 5-lobed (*Meliphlea*[2]). Carpels ∞, apex rotund, truncate, muticous, or dorsally angulate, or 2-bristled, separating from axis at maturity, 2-valved. —Shrubs, undershrubs, or herbs (habit of *Malva* and *Malvastrum*); leaves usually angular or lobed; flowers[3] axillary or in spikes, or terminal racemes; pedicels long, or oftener very short almost wanting, solitary or fasciculate-cymose; bractlets 3, sometimes more or less shortly connate into involucel under flower (*Anisodontea, Meliphlea*[4]), or oftener free (*Warm America, South Australia*[5]).

55. **Modiola** Mœnch.[6]—Flowers of *Abutilon* (or *Sphæralcea*), style branches ∞ (equal in number to cells), filiform, apex capitate stigmatiferous. Carpels ∞; dorsally 2-bristled, 2-valved inwardly between seeds, transversely septate, separating from axis at maturity; seeds reniform; other characters of *Sphæralcea.*—A herb throwing out prostrate roots at base; leaves partite; flowers[7] axillary, pedunculate,[8] bractlets 3, free under flower (*America and South Africa*[9]).

56. **Howittia** F. Muell.[10]—Calyx 5-fid, valvate. Corolla of *Malva.* Stamens ∞ (of *Sida*). Staminal column divided into filaments at apex. Germen 3-locular; ovules in each cell 2, collaterally ascending; style branches 3, apex capitate stigmatiferous. Capsule[11] depressed-globose muticous, loculicidal; valves 3, inwardly septiferous at middle; seeds ascendent; cotyledons 3-fid.—A sarmentose stellate tomentose shrub; flowers[12] axillary solitary pedunculate, ebracteolate (*Australia*[13]).

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[1] *Pl. Us. Brasil.*, t. 52.—DC., *Prodr.*, i. 435. —Endl., *Gen.*, n. 5272.—Payer, *Thèse Malvac.*, 5, 23.—A Gray, *Gen. Ill.*, t. 69.—B. H., *Gen.*, 204, n. 22. — *Sphæroma* Schltl, in *Linnæa*, xi. 352.—*Phymosia* Desvx., in *Ham. Prodr. Fl. Ind. Occ.*, 49.

[2] Zucc., in *Abh. Ak. Mun.*, ii. 359, t. 9.

[3] Red, carnation or violet.

[4] Presl, *Bot. Bem.*, 18.—*Sphæroma* Harv., *Fl. Cap.*, i. 166.

[5] Spec. ad 25, quar. 4 capens.—Jacq., *Hort. Schœnbr.*, t. 293 (*Malva*).—Cav., *Diss.*, ii. t. 16, fig. 1, t. 20, fig. 1; *Ic.*, t. 95 (*Malva*).—A. S. H., *Fl. Bras. Mer.*, i. 209.—Spach, *Suit. à Buffon*, iii. 357.—Harv. & Sond, *Fl. Cap.*, i. 165.—*Bot. Mag.*, t. 2544, 2787, 2839 (*Malva*).—Walp., *Rep.*, i. 296; ii. 789; *Ann.*, i. 100; ii. 140; vii. 397.

[6] *Meth.*, 620.—DC., *Prodr.*, i. 435.—Endl., *Gen.*, n. 5273,—Payer, *Thèse Malvac.*, 6, 22. —B. H., *Gen.*, 205, n. 23.—A. Gray, *Gen. Ill.*, t. 128.—*Haynea* Reichb., *Consp.*, 202.

[7] Small, red.

[8] Perhaps better as a section of *Sphæralcea*, if distinguished from *Abutilon* or *Wissadula* with septate carpels?

[9] Spec. 1 (?) *M. caroliniana.*—*M. multifida* Mœnch, *loc. cit.*—A. S. H., *Fl. Bras. Mer.*, i. 210, t. 43.—Walp., *Rep.*, i. 296.—*Malva caroliniana* L., *Spec.*, 969.

[10] In *Hook. Journ.*, viii. 9; *Pl. Vict.*, i. 167, t. 4.—B. H., *Gen.*, 203, n. 18.

[11] Nearly as in *Hibiscus Bombycellis*, but habit of plant and androceum quite of *Sida.*

[12] Somewhat purple.

[13] Spec. 1. *H. trilocularis* F. Muell., *loc. cit.*—Benth., *Fl. Austral.*, i. 198.—Walp., *Ann.*, vii. 395.

57. **Kydia** Roxb.[1] — Flowers hermaphrodite or polygamous-diœcious. Calyx 5-fid, valvate. Corolla rather short (malvaceous). Stamens ∞ ; apex of column divided into 5 branches ; anthers (barren in female flowers, shortly stipitate) at apex of each branchlet 2–10, sessile globose-capitate, 1-locular, wide 2-valved. Germen 2, 3-locular ; ovules in each cell 2, ascending ; micropyle extrorse inferior ; style branches 2, 3, apex stigmatiferous dilated or wide peltate (in male flowers short placed on the abortive germen). Capsule depressed-globose muticous loculicidal ; seeds ascending, reniform wingless ; embryo ?—Trees thinly stellate-tomentose ; leaves alternate, entire or lobed, digitinérved ; flowers in large much ramified cymiferous racemes ; bractlets 4–6, foliaceous, patent under fruit[2] (*Eastern India*[3]).

IX. MALOPEÆ.

58. **Malope** L.—Calyx 5-fid, valvate, contorted corolla, and stamens of *Malva*. Carpels ∞ , inserted on the convex receptacle, distinct. Germen in each 1-locular ; style filiform, inwardly longitudinally stigmatiferous. One ovule in each germen inwardly inserted above the base, ascendent ; micropyle extrorse inferior. Achenes ∞, distinct, irregularly inserted on the globose receptacle, multiplicate capitate-congested in fruit, finally deciduous, indehiscent ; seed ascendent (of *Malva*).—Annual herbs ; leaves alternate stipulate, entire or 3-fid, glabrous or pilose ; flowers pedunculate ; bractlets 3, large cordate, distinct, in verticillate involucel (sometimes wide membranous) under flower (*Mediterranean region*). See p. 91.

59. **Kitaibelia** W.[4]—Flowers 5-merous (of *Malope*) ; styles filiform, apex inwardly stigmatiferous. Carpels ∞,[5] finally congested

[1] *Pl. Coromand.*, iii. 11, t. 215, 216.—Spach, *Suit. à Buffon*, iii. 456.—DC., *Prodr.*, i. 500.—Endl., *Gen.*, n. 5353.—B. H., *Gen.*, 203, n. 19.

[2] "Gen. ab auctt. *Buettneriaceis* adscit. ; sed antheræ . . . omnino *Sidæ*. Bracteolæ et capsula fere *Hibiscearum*, sed column. stam. *Abutilearum*, inter quas *Howittiæ* accedit." (B. H., *loc. cit.*).

[3] Spec. 2 (?). Wight & Arn., *Prodr.*, i. 69.—Wight, *Icon.*, t. 879–881.—Thw., *En. Pl. Zeyl.*, 30.

[4] In *Neue Schr. Nat. Fr. Berl.*, ii. 107.—DC., *Prodr.*, i. 436.—Endl., *Gen.*, n. 5268.—B. H., *Gen.*, 200, n. 2.

[5] Concerning the evolutions of which see Payer, *Organog.*, 34, t. 8. Styles filiform, branches inwardly stigmatiferous at apex.

in capitule, the greater part aborting at maturity ; a few accrescent, scarcely separating from axis, dorsally dehiscing in 2 valves. Seed adscendent (of *Malope*).—Lofty perennial herbs; leaves angular; flowers[1] axillary solitary or ∞, pedunculate, encircled at base by involucel 6–9-fid, longer than calyx (*South bank of Danube*[2]).

60. **Palava** Cav.[3]—Flowers of *Kitaibelia ;* styles filiform, apex swollen stigmatiferous; mature carpels ∞ (of *Malope*), indehiscent separating from receptacle.—Glabrous or tomentose herbs ; leaves usually lobed or dissected, flowers[4] ecalyculate axillary, solitary, pedunculate (*Chili, Peru*[5]).

X. URENEÆ.

61. **Urena** L.—Flowers hermaphrodite ; calyx 5-fid or 5-dentate, valvate. Corolla (of *Malveæ*) and stamens ∞ (very rarely aborting 5–10) ; column below apex truncate or 5-dentate, filaments shortly or very shortly exserted; anthers reniform, 1-locular, extrorsely rimose. Germen 5-locular ; cells oppositipelatous ; 1 ovule, ascendent; micropyle extrorse inferior; style branches 10 (of which 5 alternate with the cells), capitellate stigmatiferous at apex. Mature carpels separating from short axis at maturity, smooth, reticulate or externally echinulate or aristate, sometimes muricate, or glochidiate (*Evurena*), more rarely membranous-2-winged; or coriaceous, and outwardly mucilaginous (*Lopimia*), either indehiscent (*Lebretonia, Evurena*), or dehiscent 2-valved ; seed ascendent (of *Malveæ*).—Shrubs, undershrubs or herbs, glabrescent, tomentose or hispid; leaves often angular or lobed ; flowers sessile or more or less long-pedunculate, sometimes at apex of branches capitate-congested or glomerulate bractlets 5–∞, free or connate among themselves at base, and also with tube of calyx in verticillate involucel under flower (*All the warm regions of the Globe*). See p. 94.

[1] Handsome, white or pink.

[2] Spec. 1. *K. vitifolia* W., *loc. cit.* —Waldst. & Kitaib., *Pl. Rar. Hung.*, i. 29, t. 3. —Reichb., *Ic. Fl. Germ.*, v., t. 165.—Walp., *Rep.*, i. 290.

[3] *Diss.*, 40, t. 11, figs. 4, 5.—Sav., in *Lamk. Dict.*, iv. 695 ; *Ill.*, t. 577.—DC., *Prodr.*, i. 458.—Endl., *Gen.*, n. 5266.—Payer, *Thèse Malvac.*, 16.—Benth., in *Journ. Linn. Soc.*, vi. 101.—B. H., *Gen.*, 200, n. 3.—*Palavia* Mœnch, *Meth.*, 609.

[4] Purple.

[5] Spec. 2, 3, Lhérit., *Stirp.*, t. 50 (*Malope*). —Lamk., *Ill.*, t. 577.—*Bot. Mag.*, t. 3100.—*Bot. Reg.*, t. 1375.—Walp., *Rep.*, i. 190.

62. **Pavonia** Cav.[1]—Calyx 5-fid, 5-dentate, valvate. Corolla (of *Malveæ*[2]) connate at base with staminal column, truncate at apex or 5-dentate, bearing ∞ filaments outwardly and below; anthers of *Malveæ*.[3] Germen 5-locular; cells alternipetalous (or sometimes oppositipetalous); ovule 1 (of *Urena*); style branches 10 (placed as in *Urena*), apex capitellate stigmatiferous. Carpels 5, separating from axis at maturity, apex rotund or truncate, naked at back; cocci sometimes externally covered with mucilage (*Lopimia*[4]); 1–3-aristate, naked at back, 1–3-aristate or 1–3-rostrate, sometimes reticulate or echinulate,[5] sometimes but more rarely membranous-2-winged indehiscent (*Lebretonia*[6]) or more or less high 2-valved (*Asterochlæna*[7]); seeds ascendent.—Shrubs, undershrubs or herbs, glabrescent or oftener tomentose or hispid; leaves usually angular or lobed; flowers[8] pedunculate, sometimes at apices of branchlets shortly racemose or capitate-congested; bractlets under flower 5, or ∞,[9] sometimes distinct, sometimes connate between themselves at base and with base of calyx[10] (*All warm regions of the Globe*[11]).

63? **Malachra** L.[12]—Flowers nearly of *Urena*; calyx 5-fid or 5-

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[1] *Diss.*, iii. 132, t. 45–47, 49.—Lamk., *Dict*, v. 102; Suppl., iv. 334; *Ill.*, t. 585.—DC., *Prodr.*, i. 442.—Endl., *Gen.*, n. 5275 (part.).—Spach, *Suit. à Buffon*, iii. 363.—Payer, *Thèse Malvac.*, 21; *Organog.*, 38, t. 7.—H. Bn., in *Adansonia*, ii. 176; in *Payer Fam. Nat.*, 281.—A. Dickson, in *Adansonia*, iv. 208, t. 6.—A. Gray, *Gen. Ill.*, t. 130.—B. H., *Gen.*, 205, n. 26.—*Thorntonia* Reichb., *Consp.*, 202.—*Diplopenta* Alef., in *Œstr. Bot. z. Schr.* (1863), 10.

[2] Sometimes subaborted, subclosed.

[3] In *P. hastata* Cav., we sometimes see flowers at every age 5-androus; staminal leaves simple to the end, while in normal flowers they finally become compound or lobate, that is polyandrous (see *Adansonia*, ii. 176). For a plant (nearly the same) see F. Mueller (in *Hook. Journ.* viii. 8) under the generic name of *Greevesia* (Benth., *Fl. Austral.*, i. 207.—Walp., *Ann.*, vii. 400).

[4] Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. t. 96.—DC., *Prodr.*, i. 459.

[5] Not as in *Urena*, glochidate.

[6] Schranck, *Pl. Rar. Hort. Monac.*, t. 90.—DC., *Prodr.*, i. 446.

[7] Garcke, in *Bot. Zeit.* (1850), 666.

[8] White, pale yellow, golden, reddish, pink, somewhat purple or violet.

[9] In sect. *Lopimia*.

[10] "Gen. *Urenæ* et *Malvaviscо* arcte aff., in sect. (pot. quam gen.) plures dividend., Botan. system. sedulo commendatur." (B. H., *Gen.*, 206.) Sect. ex Endl., 3 scil.: 1. *Eupavonia* (*Pavonia* Nees & Mart.); cocci dry muticous or aristate at apex 2-valved incl.: *Typhalea* (DC.), *Malache* (Trew), *Malvaviscoides* (*Anotea* DC.); 2, *Lopimia* (Nees); 3, *Lebretonia* (Schr.).

[11] Spec. ad 70, H. B. K., *Nov. Gen. et Spec.*, v. 279, t. 477.—A. S. H., *Pl. Us. Bras.*, t. 53; *Fl. Bras. Mer.*, i. 210, t. 44–47.—Wall., *Pl. As. Rar.*, i. 23, t. 26 (*Urena*).—Reichb., *Ic. Exot.*, t. 203, 215, 227.—C. Gay, *Fl. Chil.*, i. 307.—Moric., *Pl. Nouv. Amér.*, t. 72–75.—A. Rich., *Fl. Cub.*, t. 13.—Thw., *Enum. Pl. Zeyl.*, 26.—Griseb., *Fl. Brit. W.-Ind.*, 81.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 159.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 189.—Harv. & Sond., *Fl. Cap.*, i. 169.—Benth., *Fl. Austral.*, i. 207.—*Bot. Reg.*, t. 339.—*Bot. Mag.*, t. 3692 (*Lebretonia*), 4365 (*Lopimia*).—Walp., *Rep.*, i. 297; ii. 789; v. 90; *Ann.*, i. 100; ii. 140; iv. 303; vii. 399.

[12] *Mantiss.*, n. 1266.—J., *Gen.*, 272.—DC., *Prodr.*, i. 440.—Endl., *Gen.*, n. 5292.—Payer, *Thèse Malvac.*, 20.—A. Gray, *Gen. Ill.*, t. 129.—B. H., *Gen.*, 205, n. 24.

dentate. Carpels 5, separating from axis at maturity, obovoid, membranous or coriaceous, indehiscent, or slightly dehiscent at inner angle; seeds reniform ascending, and other characters of *Urena*.—Hispid herbs; leaves angular or lobed; flowers[1] congested in dense capitula axillary or terminal, bracts foliaceous, involucrate; bractlets unequal sometimes foliaceous irregularly mingled with flowers or 0[2] (*Warm America*[3]).

64? **Gœthea** Nees & Mart.[4]—Flowers nearly of *Urena;* calyx 5-fid, valvate or subreduplicate and petals short. Stamens ∞; apex of column 5-dentate, filament exserted below apex. Germen and style (10-branched) of *Urena;* cells 5, alternipetalous. Carpels 5, separating from axis at maturity, apex rotund muticous, indehiscent; seeds ascending, micropyle introrse inferior. Other characters of *Urena*.—Shrubs; leaves entire or remote and unequally dentate; flowers[5] axillary solitary or very often growing from woody stems (showing cicatrices of long-since fallen leaves) cymose; bractlets 5, oppositisepalous, or 4–6, large including coloured calyx[6] (*Brazil*[7]).

65. **Malvaviscus** Dill.[8]—Calyx 5-fid, valvate. Corolla and stamens of *Urena;* staminal column truncate below apex, filaments ∞ exserted. Germen 5-locular; cells oppositipetalous, 1-ovulate; style branches 10 (of which 5, alternate with the lobes), apex capitellate stigmatiferous. Fruit subglobose baccate; carpels finally separating from axis, indehiscent; ascendent seed, and other characters of *Urena*.—Small trees, or shrubs, sometimes hispid; leaves

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[1] Whitish or pale yellow.

[2] Genus better as a section of *Urena*. (?)

[3] Spec. about 5 (of which 2 have been introdueed into the warm regions of the Old World, and are widely dispersed there). Cav., *Diss.*, ii. t. 33, fig. 2.—Jacq., *Ic. Rar.*, t. 548, 549.—DC., *Pl. Rar. Jard. Gen.*, iv. t. 5.—A. S. H., *Fl. Bras. Mer.*, i. 216.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 180.—Turcz., in *Bull. Mosc.* (1858), i. 205.—*Bot. Reg.*, t. 467.—Walp., *Rep.*, i. 322; v. 95; *Ann.*, i. 104; ii. 156; vii. 398.

[4] In *Nov. Act. Nat. Cur.*, xi. 91, t. 8 (nec 7).—DC., *Prodr.*, i. 501.—Endl., *Gen.*, n. 5275 d.—Garcke, in *Bonplandia*, ix. 18.—B. H., *Gen.*, 206, n. 27.—*Schouwia* Schrad., in *Gœtt. Gel. Anzeig.* (1821), 717 (ex Endl.).

[5] Often red.

[6] A genus differing from *Urena* sect. *Pavonia* only in the proportion and inflorescence of its perianth and in its inflato-vesicular involucel.

[7] Spec. 3. *Bot. Mag.*, t. 4677.—Walp., *Ann.*, iv. 303; vii. 401.

[8] *Elth.*, 210, t. 170, fig. 208.—Cav., *Diss.*, iii. 131, t. 48, fig. 1 (nec Gærtn.).—DC., *Prodr.*, i. 445.—Endl., *Gen.*, n. 5278.—Payer, *Thèse Malvac.*, 7, 20; *Organog.*, 36, t. 6.—H. Bn., in *Payer Fam. Nat.*, 281.—A. Gray, *Gen. Ill.*, t. 131.—B. H., *Gen.*, 206, n. 28.—*Achania* Sw., *Prodr.*, 102; *Fl. Ind. Occ.*, 1222.

entire, dentate or angular-lobed; flowers[1] usually pedunculate; bractlets ∞, in verticillate involucel under flower (*Trop. and Subtrop. America*[2]).

XI. HIBISCEÆ.

66. **Hibiscus** L. — Flowers hermaphrodite; receptacle convex. Calyx 5-dentate or 5-fid, sometimes membranous or vesiculate-inflated (*Trionum*), valvate or reduplicate-valvate, sometimes cut like a spathe and base finally circumcissile (*Abelmoschus*). Corolla and stamens of *Malveæ;* staminal column below apex 5-dentate or truncate (rarely antheriferous) filaments ∞, with subreniform anthers, extrorse 1-locular, 1-rimose, exserted. Germen 5-locular; cells alternipetalous; ovules in internal angle ∞, more rarely 2 (*Senra*), or 3, 4; style branches 5, patent or more rarely suberect or erect-connate, either very short, or longer thickened, apex capitate stigmatiferous or subspathulate. Capsule loculicidal 5-valved; endocarp, sometimes membranous separating (*Lagunaria*), or with false dissepiment torn in dehiscence exserted within cells (*Paritium, Bombycodendron*). Seeds reniform or subglobose, rarely obovoid, glabrous or more or less tomentose or pilose, sometimes more or less involute in cottonous wool (*Bombycella*); albumen small or 0.—Herbs, undershrubs, shrubs or trees, glabrous, tomentose or hispid; leaves varied, sometimes partite, stipulate; flowers solitary or cymose. Bractlets under flower ∞, entire (*Ketmia*), sometimes at apex furcate or foliaceous-appendiculate (*Furcaria*), free or coalescing at base (*Paritium*), more rarely 3, sometimes large cordate, finally membranous (*Senra*), or minute setaceous, scarcely to be seen or quite wanting (*Lagunea, Lagunaria*) (*All Tropical and Extra-tropical regions of the Globe*). See p. 95.

67. **Gossypium** L.[3]—Flowers nearly of *Hibiscus;* calyx truncate

[1] Petals erect, connivent or upper part patent, red.

[2] Spec. ad 6. A. Rich., *Fl. Cub.*, t. 14.—H. B. K., *Nov. Gen. et Spec.*, v. 287.—Griseb., *Fl. Brit. W.-Ind.*, 83.—Turcz., in *Bull. Mosc.* (1858), i. 190.—Seem., *Bot. Her.*, 82.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 268.—*Bot. Reg.*, t. 11 (*Achania*).—*Bot. Mag.*, t. 2305, 2374.—Walp., *Rep.*, i. 307; v. 92; *Ann.*, iv. 307; vii. 401.

[3] *Gen.*, n. 845.—Adans., *Fam. des Pl.*, ii. 401.—J., *Gen.*, 274.—Gærtn., *Fruct.*, ii. 246,

or obtuse 5-dentate, or shortly 5-fid, usually black-punctate. Corolla of *Hibiscus*. Stamens ∞ ; column below apex naked or more generally antheriferous, much more rarely with filaments exserted; anthers reniform, 1-locular. Germen 3–5-locular; cells ∞-ovulate; apex of style clavate, 3–5-sulcate or costate, 3–5-stigmatiferous. Capsule loculicidal 3–5-valved; seeds densely or more rarely scantily (*Sturtia*,[1] *Thurberia*[2]) woolly; embryo scantily albuminous, cotyledons foliaceous much folded, usually black-punctate, auriculate base involving straight radicle.—Tall herbs or more rarely subarborescent shrubs; leaves entire, or oftener 3–9-lobed or 3-partite; flowers[3] pedunculate axillary or terminal; bracts under flower 3, cordate, usually large, sometimes narrow, more pointed (*Sturtia*), rarely entire, dentate or incised[4] (*All warm regions of Globe*[5]). See p. 99.

68? **Thespesia** Corr.[6]—Flowers nearly of *Gossypium* (or *Hibiscus*); calyx truncate, minute or setaceo-dentate, more rarely 5-fid, valvate. Stamens ∞; column below apex dentate or filaments exserted the whole length from apex. Germen 5-locular; cells pauciovulate; style at apex clavate, either 5-sulcate, or divided into 5-branches, short erect clavate stigmatiferous. Capsule ligneous-coriaceous, subglobose or more or less elongated, loculicidal 5-valved, or with difficulty tardily dehiscing; seeds glabrous or more or less woolly; embryo of *Gossypium*.—Trees or tall herbs; leaves stipulate, entire or angular-

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t. 134.—Lamk., *Dict.*, ii. 133; Suppl., ii. 368; *Ill.*, t. 586.—DC., *Prodr.*, i. 456.—Spach, *Suit. à Buffon*, iii. 388.—Endl., *Gen.*, n. 5286.—Payer, *Thèse Malvac.*, 24.—B. H., *Gen.*, 209, 982, n. 39.—H. Bn., in *Payer Fam. Nat.*, 281.—Todar., *Obs. s. Tal. Spec. di Cot.*, 17.—*Xylon* T., *Inst.*, 101, t. 27.

[1] R. Br., *App.*, *Sturt Exped.*, 5.—Todar, *loc. cit.*, 18.

[2] A. Gray, *Pl. Thurber.*, in *Mem. Am. Acad.*, v. 308.—B. H., *Gen.*, 209, 982. n. 38.—Torr., *Bot. Mex. Bound. Surv.*, t. 6.— ? *Ingenhousia* Moç. & Sess., in *DC. Prodr.*, i. 474 (ex B. H., *loc. cit.*).

[3] White, pink or purple, more often bright yellow, rather large handsome.

[4] Oftener black spotted like calyx and cotyledons.

[5] Spec. 4 (ex B. H.), 7 [ex Parl., *Spec. d. Cot. Fir.* (1866), c. ic.], 43, of which 9 are uncertain (ex Todar., *op. cit.*). Cav., *Diss.*, vi. t. 164, 166–169, 193.—A. S. H., *Fl. Bras. Mer.*, i. 254.—Wight, *Ill.*, t. 27, 28 C; *Ic.*, t. 9–11.—Royl., *Ill. Himal.*, t. 23.—Reichb., *Ic. Fl. Germ.*, v. t. 180.—C. Gay, *Fl. Chil.*, i. 309.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 210.—H. Bn., in *Adansonia*, x. 174.—Benth., *Fl. Austral.*, i. 222.—Griseb., *Fl. Brit. W.-Ind.*, 85.—Seem., *Fl. Vit.*, 19.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 170.—Walp., *Rep.*, i. 312; v. 93; *Ann.*, ii. 149; iv. 307 (*Thurberia*), 309; vii. 409.

[6] In *Ann. Mus.*, ix. 290, t. 8, fig. 2.—DC., *Prodr.*, i. 455.—Endl., *Gen.*, n. 5284.—Payer, *Thèse Malvac.*, 21.—B. H., *Gen.*, 208, n. 37.—*Malvaviscus* Gærtn., *Fruct.*, ii. 253, t. 135 (nec Dill.).—*Tiparium* Garcke, in *Bot. Zeit.* (1849), 824.—*Azanza* Alef., in *Bot. Zeit.* (1861), 297 (nec DC.).

lobed; flowers[1] pedunculate axillary; bractlets under flower 3–5, small or deciduous[2] (*Trop. Asia, Malaysia, Pac. Arch.*[3]).

69? **Fugosia** J.[4]—Flowers nearly of *Gossypium* (or *Hibiscus*); calyx 5-fid, valvate. Staminal column dentate below apex, truncate antheriferous, filaments ∞ exserted. Germen 3, 4-locular; cells few or ∞-ovolate; style clavate at apex 3, 4-sulcate or divided into 3, 4 short branches erect clavate stigmatiferous. Capsule loculicidal 3, 4-valved; seeds subglobose, generally pubescent or woolly; embryo scantily albuminous; cotyledons 2, 3-plicate, base auriculate involving short radicle.—Shrubs or undershrubs;[5] leaves entire, lobed or more rarely partite; flowers[6] generally solitary axillary pedunculate; bractlets under flower 3–∞, generally small or deciduous, sometimes dentiform[7] (*Warm America, Trop. Africa, Australia*[8]).

70? **Kosteletzkya** Presl.[9]—Flowers nearly of *Hibiscus;* filaments of staminal column ∞, exserted below entire or 5-dentate apex. Germen 5-locular; ovules solitary in cells ascending; micropyle extrose inferior; style branches 5, apex stigmatiferous capitate or sometimes dilated. Capsule depressed, prominently 5-angled, loculicidal; seeds solitary reniform ascending; other characters of *Hibiscus.*—Shrubs or herbs, usually hispid or scabrous; leaves sometimes sagittate or angular-lobed; flowers[10] solitary or more numerous

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[1] Handsome, generally bright yellow.

[2] A genus closely related to *Gossypium,* thence to *Paritium* among the *Hibisci,* and rather to be considered a section of those, more frequently distinguished by the character of style and seed (see Garcke, *loc. cit.*).

[3] Spec. 5, 6. Wight, *Icon.*, t. 5, 8.—Seem., *Fl. Vit.*, 18.—Thw., *Enum. Pl. Zeyl.*, 27.—Benth., *Fl. Austral.*, i. 221.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 209.—Walp., *Rep.*, i. 812 (part.).

[4] *Gen.*, 274.—DC., *Prodr.*, i. 457.—Endl., *Gen.*, n. 5279.—Payer, *Thèse Malvac*, 24.—B. H., *Gen.*, 208, 439, 982, n. 36.—*Cienfugosia* Cav., *Diss.*, 174, t. 72, fig. 2.—Garcke, in *Bonplandia,* viii. 148.—*Cienfuegia* W., *Spec. Pl.*, iii. 723.—*Redoutea* Vent., *Jard. Cels.*, t. 11. — ? *Bombycospermum* Presl, *Rel. Hænk.*, ii. 137, t. 71.—*Elidurandia* Buckl., in *Proceed. Amer. Acad.* (1861), 450 (ex A Gray).

[5] Habit of *Hibiscus.*

[6] Handsome, generally bright yellow.

[7] Better perhaps as one genus with *Thespesia* and *Hibiscus?*

[8] Spec. 10–12, A. S. H., *Fl. Bras. Mer.*, i. 251, t. 49, 50.—Benth., *Fl. Austral.*, i. 219.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 208.—*Bot. Mag.*, t. 4218, 4261.—Walp., *Rep.*, i. 307; v. 92; *Ann.*, iv. 308; vii. 408, 409 (*Elidurandia*).

[9] *Rel. Hænk.*, ii. 130, t. 70.—DC., *Prodr.*, i. 447.—Endl., *Gen.*, n. 5276.—Payer, *Thèse Malvac.*, 20.—A. Gray, *Gen. Ill.*, t. 132.—B. H., *Gen.*, 206, n. 29.—*Thorntonia* Reichb., *Consp.*, 202 (part.).

[10] Bright yellow, pink or purple, corolla patent or erect-convolute.

axillary, sometimes in simple or ramified racemes; bractlets under calyx 7–10, sometimes small or 0 (*Warm America*[1]).

71. **Decaschistia** Wight & Arn.[2]—Flowers nearly of *Hibiscus* (or *Kosteletzkya*); filaments of staminal column ∞, exserted below apex. Germen 10-locular; cells 1-ovulate; style branches, 10 apex capitellate stigmatiferous. Capsule loculicidal 10-valved; seeds reniform ascending; micropyle extrorse inferior.—Shrubs or herbs, tomentose; leaves entire or lobed; flowers in upper axils solitary or glomerate at summit of branchlets, shortly pedicellate; bractlets 10, verticillate under flower (*Eastern India*[3]).

72. **Julostyles** Thw.[4]—Calyx 5-fid, valvate. Petals (spotted in lower part), base connate in cupuliform corolla. Stamens 10, 2-seriate; filaments connate in column 5-dentate at apex.[5] Germen 2-locular; ovules in each cell 2, collaterally ascending; micropyle extrorse inferior; style branches 2, densely woolly, apex wide peltate-stigmatiferous. Capsule globose stellate-hispid, 2-valved dehiscing (?).—A tree; leaves lanceolate or ovate-lanceolate, entire 3-nerved at base; flowers crowded in large much ramified pendulous cymes, surrounded by epicalyx of 4 bracts, wide subconnate at base, constant, longer than calyx (*Zeylania*[6]).

73. **Dicellostyles** Benth.[7]—Calyx 5-fid, valvate. Corolla nearly of *Julostyles*. Stamens ∞; column short, filaments ∞, exserted below apex. Germen 2-locular (nearly of *Julostyles*); style branches 2, at apex wide globose stigmatiferous. Capsule globose stellate-hispid, 8-costate; cocci 2, indehiscent solute from axis; seed (solitary by abortion in each coccus) reniform ascending; albumen fleshy; embryo in-

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[1] Spec. ad 5. Cav., *Diss.*, iii. t. 50 (*Hibiscus*).—DC., *Prodr.*, i. 447 (*Hibisci* sect. *Pentaspermum*).—Griseb., *Fl. Brit. W.-Ind.*, 83.—Turcz., in *Bull. Mosc.* (1858), i. 192.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 165.—Walp., *Rep.*, i. 302; *Ann.*, i. 100; ii. 142; iv. 304; vii. 401.

[2] *Prodr. Fl. Penins. Ind.*, 52; *Icon.*, t. 42, 88.—Endl., *Gen.*, n. 5285.—Payer, *Thèse Malvac.*, 20.—B. H., *Gen.*, 206, n. 30.

[3] Spec. 2. Walp., *Rep.*, i. 312.

[4] Thw., *Enum. Pl. Zeyl.*, 30.—B. H., *Gen.*, 207, n. 31.

[5] Pollen of *Hibiscus*. Perianth also and anthers as in *Malveæ* (not *Sterculia*).

[6] Spec. 1. *J. angustifolia* Thw., *loc. cit.*—Walp., *Ann.*, vii. 402.—*Kydia angustifolia* Arn.

[7] *Gen.*, 207, n. 32.

curved, radicle short; cotyledons 2-plicate.—Trees, glabrescent or stellate-tomentose; leaves entire or subdentate, sometimes shortly 3–5-lobed; flowers solitary axillary pedunculate; bracts 4–6, under flower verticillate in involucre (nearly 1-inch), lanceolate, subconnate at base, stellate-patent much longer than calyx (*Eastern mountainous India, Zeylania*[1]).

XII. BOMBACEÆ.

74. **Bombax** L.—Flowers regular, hermaphrodite; receptacle depressed or slightly concave. Calyx (afterwards sometimes slightly perigynous) cupulate, truncate or irregularly 3–5-lobed. Corolla (malvaceous); petals narrow or obovate generally pubescent, usually connate at base among themselves and with the androceum, contorted in bud. Stamens ∞; column above divided into ∞ filaments, 1-anthered, or more rarely 2-anthered (*Eriotheca*); the interior or nearly all more or less 2-nate connate and 5-adelphous at base; anthers 1-lobed, more or less arched, rimose at margin. Germen free, 5-locular; cells ∞-ovulate; style clavate at apex 5-agonal or very shortly 5-fid. Capsule coriaceous or more or less ligneous, loculicidal; cells 5, inwardly clothed with very dense wool (springing from interior of pericarp) enfolding seed. Seeds subglobose or ovoid; testa crustaceous smooth or opaque, generally naked at lateral hilum; embryo scantily albuminous; cotyledons much contortuplicate, oftener surrounding straight radicle.—Lofty trees, apex often densely comose; leaves alternate long-petiolate (stipules deciduous) digitate; folioles 3–9, apex of petiole expanded in continuous disk, entire or subentire; flowers pedunculate; axillary or subterminal, solitary or cymose-fasciculate (*Trop. America, Asia, and Africa*). See p. 99.

75. **Eriodendron** DC.[2]—Perianth of *Bombax*, receptacle more or less concave with perigynous insertion. Staminal column outwardly

[1] Spec. 2. Griff., *Notul.*, iv. 534, t. 595 (*Kydia*).—Thw., *Enum. Pl. Zeyl.*, 30 (*Kydia*).

[2] DC., *Prodr.*, i. 479.—Endl., *Gen.*, n. 5302.—H. Bn., in *Payer Fam. Nat.*, 286.—B. H., *Gen.*, 210, n. 43.—*Erione* Schott, *Melet.*, 34.—*Campylanthera* Schott, *loc. cit.*—*Gossampinus* Schott, *loc. cit.*, 35.—*Ceiba* Plum., *Gen.*, t. 32.—Gærtn., *Fruct.*, t. 133.

naked (not annulate), apex divided into 5 elongated branches 2, 3-antheriferous; anthers adnate linear or anfractuous; each branch simulating one anther. Germen of *Bombax*, cells 5, ∞-ovulate; style at apex stigmatiferous clavate, 5-agonal. Capsule ligneous or coriaceous 5-locular; seeds ∞, globose or obovoid, involute in dense wool (of endocarp); testa smooth, sometimes arillate at hilum, embryo scantily albuminous or exalbuminous, cotyledons much contortuplicate involving incurved or inflexed radicle.—Unarmed or aculeate trees; leaves digitate; folioles 3–7, entire; flowers pedunculate, axillary, lateral or subterminal, solitary or fasciculate-cymose (*All warm regions of the Globe*[1]).

76. **Chorisia** H. B. K.[2]—Perianth of *Bombax*. Staminal column outwardly below middle 5-lobed; short antherless, annulate, apex 5-dentate or 5-fid; teeth or branches 2-antheriferous, anthers adnate linear or anfractuous (in teeth or lobes each simulating one anther).[3] Germen of *Bombax;* cells 5, sometimes incomplete, ∞-ovulate; style filiform, shortly exserted from staminal-tube, apex stigmatiferous capitate, obscurely 5-lobed. Capsule ligneous loculicidal, incompletely 3–5-celled, 3-valved; middle valve inwardly septiferous; seeds involute in dense wool (of endocarp?)—Aculeate trees; leaves alternate long petiolate digitate; folioles 5–7, entire or serrate, with articulate petiole; flowers[4] pedunculate axillary or subracemose; bractlets under flower 2, 3[5] (*Trop. America*).[6]

77. **Pachira** Aubl.[7]—Calyx cupulate, apex truncate or obsolete 5-dentate. Petals (nearly of *Bombax*), much longer than calyx,

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[1] Cav., *Diss.*, t. 151, 152.—A. S. H., *Fl. Bras. Mer.*, i. 264, t. 52.—Mart., *Nov. Gen. et Spec.*, i. t. 96–98.—Wight, *Icon.*, t. 400.—Spach, *Suit. à Buffon*, iii. 427.—Thw., *Enum. Pl. Zeyl.*, 28.—Griseb., *Fl. Brit. W.-Ind.*, 88.—A. Gray, *Amer. Expl. Exp.*, i. 182.—Mast., in *Oliv. Fl. Trop. Afr., Bot.*, i. 213.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 322.—*Bot. Mag.*, t. 3360.—Walp., *Rep.*, i. 330; *Ann.*, ii. 159; iv. 318.

[2] *Nov. Gen. et Spec.*, v. 295, t. 485.—DC., *Prodr.*, i 480.—Endl., *Gen.*, n. 5299.—B. H., *Gen.*, 210, n. 44.

[3] "In *C. rosea* Seem. (*Bot. Her.*, 84), columnæ staminea rami ut in *Eriodendro* elongati, apice antheriferi, sed annulus exterior ut in *Chorisia* adest." (B. H., *loc. cit.*)

[4] Pink or reddish.

[5] A genus scarcely distinct from *Eriodendron*.

[6] Spec. 3, 4. A. S. H., *Pl. Us. Bras.*. t. 63; *Fl. Bras. Mer.*, i. 266.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 321.—Walp., *Rep.*, i. 329; *Ann.*, iv. 318.

[7] *Guian.*, 725, t. 291, 292.—J., *Gen.*, 279.—Lamk., *Dict.*, iv. 690; *Ill.*, t. 589.—DC., *Prodr.*, i. 478.—Endl., *Gen.*, n. 5298.—H. Bn., in *Payer Fam. Nat.*, 286.—B. H., *Gen.*, n. 41.—*Carolinea* L. f., *Suppl.*, 51.—Spach, *Suit. à Buffon*, iii. 423.—Schott & Endl. *Melet.*, 35.

oblong or linear, hypogynous at base or slightly perigynous, exterior often tomentose, præfloration at apex contorted or involute,[1] erect-patent at anthesis, or finally generally recurved revolute. Stamens ∞; column separated above into ∞-filaments, 1-antheriferous, often 2-nate, connate at base, 5–∞-adelphous;[2] anthers reniform, 1-locular, curvo-rimose at margin. Germen free, sessile; cells 5–∞-ovulate; style clavate at apex, shortly stigmatiferous, 5-lobed. Fruit oblong or subglobose, coriaceous or ligneous, loculicidal, on account of septa being destroyed at maturity, finally often sub-1-locular; valves 5, inwardly glabrous. Seeds ∞, subquadrate-cuneate, externally smooth, naked; testa crustaceous; hilum usually large; embryo scantily albuminous or exalbuminous, fleshy, involute-plicate, involving straight radicle.—Trees, often lofty; coma dense; leaves alternate, digitate; folioles 3–9, sometimes articulate at base, entire; stipules deciduous; flowers pedunculate, axillary, solitary; bractlets 2, 3 (*Tropical America*,[3] *Madagascar?*).

78. **Adansonia** L.[4]—Calyx ovoid or oblong, finally subcampanulate, 5-fid, inwardly silky, valvate, deciduous. Petals (malvaceous) much longer than calyx, oblong or obovate, convolute. Stamens ∞, column connate at base with corolla, afterwards separated into ∞-filaments, rather long, 1-antheriferous; anthers terminal, reniform, 1-locular. Germen free; cells 5–10, ∞-ovulate; apex of style divided into 5–10 short branches, stigmatiferous, stellate-patent. Fruit oblong, sometimes obovoid or subglobose, ligneous, indehiscent; cells full of farinaceous pulp. Seeds ∞, nidulant in pulp, finally dry, reniform, globose or angular; testa thick; hilum lateral; embryo scantily albuminous, arched; cotyledons much

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[1] Sometimes valvate at base, more or less induplicate.

[2] Fascicles sometimes 2-seriate, exterior 5; interior stamens sometimes 1-adelphous at base. Filaments often irregular (*i.e.*, sometimes 3, 4, 2-fid).

[3] Spec. ad 15. Cav., *Diss.*, iii. 176, t. 72.—H. B. K., *Nov. Gen. et Spec.*, v. 301.—A. S. H., *Fl. Bras. Mer.*, i. 258, t. 51.—Mart., *Nov. Gen. et Spec.*, i. t. 56.—Hook., *Exot. Fl.*, ii. t. 100.—Casar., *Nov. Stirp. Bras. Dec.*, 21.—Griseb., *Fl. Brit. W.-Ind.*, 87.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 319.—*Bot. Mag.*, t. 1412, 4508, 4549.—Walp., *Rep.*, i. 329; ii. 793; v. 95; *Ann.*, ii. 159; vii. 416.

[4] *Gen.* n. 836.—Adans., *Fam. des Pl.*, ii. 399.—J., *Gen.*, 275.—Gærtn., *Fruct.*, ii. 253, t. 135.—Lamk., *Dict.*, i. 370; Suppl., i. 575; *Ill.*, t. 588.—DC., *Prodr.*, i. 478.—Spach, *Suit. à Buffon*, iii. 419.—Endl., *Gen.*, n. 5297.—H. Bn., in *Payer Fam. Nat.*, 286.—B. H., *Gen.*, 209, n. 40.—*Ophelus* Lour., *Fl. Cochinch.*, 412.—*Baobab.*, P. Alp., *Ægypt.*, 66, t. 67.—Adans., in *Act. Par.* (1759), t. 1, 2; (1761), 218, t. 16, 17.

contortuplicate, involving slightly curved radicle.—Trees; trunk short, very thick, of gigantic diameter; branches patent or sometimes deflexed, radiating from the summit of trunk in wide dense coma; leaves digitate; folioles 3–9 entire, very short petiolate; stipules deciduous; flowers axillary, solitary, pedunculate, pendulous; bractlets 2 (*Tropical Africa, Asia,* ? *Australia*[1]).

79. **Quararibea** Aubl.[2] — Flowers elongated; calyx oblong-obconical, apex 3–5-dentate or shortly 3–5-lobed, sometimes unequally cut, valvate. Petals 5, ovate-oblong or oblong linear, much narrowed at base, more or less adnate to base of staminal tube, imbricate or contorted. Stamens ∞; filaments connate, in rather long or much elongated tube, exserted; apex of tube outwardly antheriferous, subentire (*Euquararibea*), or 5-dentate (*Myrodia*[3]), sometimes short (*Matisiopsis*[4]) or long (*Matisia*), 5, 6-fid; anthers shortly stipitate or sessile, extrorse; cells either separate (*Euquararibea, Matisia*[5]) or divaricate, sometimes more or less confluent at apex (*Myrodia*), longitudinally rimose. Germen sessile, 2–5-locular; ovules in each cell[6] 2 or more rarely 3, 4, ascending or descending; style slender or filiform, freely passing through tube of androceum, apex stigmatiferous, more or less dilated or subcapitate sublobed. Fruit usually subglobose, sometimes sub-2-dymous, rarely fibrous-pulpous (*Eumatisia*), or oftener scantily fleshy (*Myrodiopsis*[7]), coriaceous or suberose-fibrous, indehiscent or unequally parting;[8] cells 1–5, oligo- or 1-spermous. Seeds laterally affixed, descending or subascending; albumen scanty, mucous or subcartilaginous; embryo rather fleshy; cotyledons contortuplicate or unequally conferruminate,

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[1] Spec. 2. Cav., *Diss.*, v. 298, t. 157.—Guillem. & Perr., *Fl. Sen. Tent.*, i. 76.—F. Muell., in *Hook. Journ.*, ix. 14.—Thw., *Enum. Pl. Zeyl.*, 28.—Benth., *Fl. Austral.*, i. 222.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 212.—*Bot. Mag.*, t. 2791.—Walp., i. 399; vii. 416.

[2] *Guian.*, 691, t. 278 (1775).—DC., *Prodr.*, i. 477.—Endl., *Gen.*, n. 5313 b.—B. H., *Gen.*, 212, n. 49.—H. Bn., in *Payer Fam. Nat.*, 285; in *Adansonia*, x. 146 (incl.: *Matisia* K., *Myrodia* Sw.).—*Gerberia* Scop., *Introd.*, n. 1297.

[3] Sw., *Prodr.*, 102 (1783); *Fl. Ind. Occ.*, ii. 1227.—Schreb., *Gen.*, n. 1147.—DC., *Prodr.*, i. 477.—Spach, *Suit. à Buffon*, iii. 415.—Endl., *Gen.*, n. 5313.—H. Bn., in *Payer Fam. Nat.*, 285; in *Adansonia*, ii. 172; ix. 146.—B. H., *Gen.*, 219, n. 8.—*Lexarza* Llave, *Nov. Stirp.*, ii. 7.

[4] H. Bn., in *Adansonia*, x. 148.

[5] H. B., *Pl. Æquin.*, i. 9, t. 2, 3.—DC., *Prodr.*, i. 477.—Endl., *Gen.*, n. 5314.—B. H., *Gen.*, 211, n. 48.

[6] Sometimes between ovules (in *Q. turbinata*) falsely septiferous.

[7] Triana & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 326.

[8] Apex oftener produced to a short acute straight truncate point.

involving radicle.—Trees or shrubs, often aromatic, odorous *Meliloti* (*Myrodia*); leaves alternate, entire or subdentate, penninerved or at base 3–5-nerved, sometimes palminerved (*Eumatisia*), glabrous or tomentose below; stipules minute linear; flowers[1] axillary or very often lateral or leaf-opposed, solitary or scantily cymose; bracts few, small, more or less remote from flower (*Tropical America*[2]). See p. 104.

80. **Ochroma** Sw.[3]—Flowers large; calyx tubular-subinfundibuliform, 5-lobed at apex; lobes dissimilar, dilated on one or both sides, induplicate at margin or partly imbricate. Corolla (of *Bombax*) 5-merous, longer than calyx, contorted, finally revolute. Stamens ∞; apex of subinfundibuliform column shortly 5-lobed, from middle to apex densely covered with adnate elongate-anfractuous anthers. Germen sessile, free; cells 5–∞-ovulate; apex of style stigmatiferous, entire, cylindrical, spirally 5-sulcate. Capsule elongated, 5–10-agonal, sometimes a little compressed, loculicidal 5-valved; pericarp outwardly shortly, internally very densely woolly-villous; valves septiferous at middle. Seeds ∞, obovoid oblong, involute or in wool of carpel; testa thin coriaceous; base of hilum exarillate; albumen fleshy; embryo rather fleshy; cotyledons wide, involute at margin; radicle short.—Trees; leaves alternate, petiolate, angular-lobed, pubescent beneath; stipules sometimes ovate-lanceolate, deciduous; flowers pedunculate at apex of branches (*Tropical America*[4]). See p. 105.

81. **Cavanillesia** Ruiz & Pav.[5]—Calyx subcampanulate, 5-fid valvate. Petals 5, 2, 3 times longer than calyx, at base becoming glandulous within, contorted. Stamens ∞; column connate with petals at base, above the base contracted, afterwards separating into ∞

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[1] White or pink, sometimes with elongated column (in sect. *Euquarariba*) 2, 3 inches.

[2] Spec. ad 15. Cav., *Diss.*, iii. 175, t. 71, fig. 2.—H. B. K., *Nov. Gen. et Spec.*, v. 306 (*Matisia*).—A. S. H., *Fl. Bras. Mer.*, i. 268, t. 51 (*Myrodia*).—Pœpp. & Endl., *Nov. Gen. et Spec.*, ii. 35, t. 150 (*Matisia*).—Tr. & Karst., *Nov. Pl. Fl. Nov.-Gran.*, 24; in *Linnæa* (1857), 86.—Benth., in *Journ. Linn. Soc.*, vi. 115.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 324.—H. Bn., in *Adansonia*, x. 180.—Walp., *Rep.*, i. 331 (*Myrodia*), 332 (*Matisia*); ii. 794 (*Myrodia*); v. 97 (*Myrodia*); vii. 417 (*Matisia*), 422 (*Myrodia*).

[3] In *Act. Holm.* (1792), 148, t. 6; *Prodr., Fl. Ind. Occ.*, 97; *Fl.*, 1143, t. 23.—DC., *Prodr.*, i. 480.—Endl., *Gen.*, n. 5306.—B. H., *Gen.*, 212, n. 51.

[4] Spec. 1, 2. Cav., *Diss.*, v. t. 153 (*Bombax*).—W., *Enum.*, 695.—Griseb., *Fl. Brit. W.-Ind.*, 88.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 323.

[5] *Prodr. Fl. Per. et Chil.*, 97, t. 20.—Corr., in *Ann. Mus.*, ix. t. 26.—Endl., *Gen.*, n. 5304.—B. H., *Gen.*, 211, n. 47.—*Pourretia* W., *Spec. Pl.*, iii. 844 (nec alior.).—DC., *Prodr.*, i. 477.

filaments, 5-adelphous, 1-antheriferous ; anthers reniform, 1-locular. Germen 3–5-locular, ovules in each cell 2, inserted at internal angle, ascending ; micropyle extrorse lateral; style capitate stigmatiferous at apex. Fruit large, vertically 5-winged, dry, linear-ligneous at centre, indehiscent. Seed sometimes 1, involute in gummy pulp, suberect; embryo exalbuminous, cotyledons contortuplicate, involving short inferior radicle.—Lofty trees ; coma often aphyllous at anthesis ; hairs stellate ; leaves alternate petiolate digitate-5–7-lobed ; flowers[1] ebracteolate, in umbelliferous cymes (*Trop. America*[2]).

82. **Hampea** Schltl.[3]—Flowers hermaphrodite, or oftener polygamous ; calyx cyathiform, straight truncate or obscurely 5-crenate, or dentate, valvate, or slightly imbricate. Petals 5, oblique, obovate, longer than calyx, connate at base among themselves, and with staminal tube, inwardly villous at base ; præfloration contorted. Stamens ∞, 1-adelphous ; tube short, filaments afterwards free elongated ; anthers reniform. Germen (in male flower rudimentary or 0), 3-locular ; style short, apex divided into short thick stigmatiferous lobes. Ovules in cells few. Capsule globose, encircled by base of calyx, loculicidal, inwardly more or less densely villous. Seeds few, unequally-ovoid or subglobose ; funicle dilated in thick fleshy conoid aril ; albumen scanty membraniform ; embryo fleshy oleose-punctuate ; cotyledons much contortuplicate, involving straight inferior radicle.—Small trees ; leaves alternate, generally long petiolate, stipulate, entire, cordate or subcordate palminerved at base ; stipules narrow linear, often acuminate, deciduous ; flowers axillary cymose ; bracts 3 inserted at summit of pedicel[4] (*Columbia, Mexico*[5]).

83. **Scleronema** Benth.[6]—Calyx clavate campanulate ; 4–5-lobed, valvate. Petals 4, 5, contorted, base scarcely adnate to staminal column. Stamens 8, base of filaments connate in short tubular

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[1] Small, pink.

[2] Spec. 2, 3. H. B., *Pl. Æquin.*, ii. t. 113. —W., *Spec. Plant.*, iii. 844 (*Pourretia*).—H. B. K., *Nov. Gen. et Spec.*, ii. 305, t. 133.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 323.

[3] In *Linnæa*, xi. 371 (nec Nees).—Endl., *Gen.*, n. 5310.—B. H., *Gen.*, 211, n. 45.

[4] Whether distinct from *Montezuma* (DC., *Prodr.*, i. 477 ; — B. H., *Gen.*, 212, n. 50) a Mexican tree, known only from a figure, of which the calyx is said to be hemispherically truncate ; stamens spirally 1-adelphous ; style clavate and fruit baccate ; cells 4, 5, or ∞-spermous ?

[5] Spec. 2. Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 188.—Walp., *Ann.*, vii. 417.

[6] In *Journ. Linn. Soc.*, vi. 109.—B. H., *Gen.*, 211, n. 46.

column, afterwards free, thickened at apex; anthers terminal, subtransverse 1-locular, rimose. Germen superior, 2–4-locular, included in cavity of column; apex of style minute 2–4-dentate. Ovules in each cell 2, collaterally ascending. Fruit. . .?—A large tree; leaves alternate, entire coriaceous, nitid, oblique penninerved, base sub-3-nerved; flower axillary 1–3-nate; pedicels rather short, apex under calyx minute 2–3-bracteolate[1] (*Trop. America*[2]).

84. **Durio** L.[3]—Flowers large hermaphrodite; calyx usually subcampanulate, 5-fid, outwardly densely lepidote. Petals 3–5, unguiculate contorted, or more rarely imbricate. Stamens ∞; upper part of column divided into ∞ filaments, 4–6-adelphous; anthers ∞, anfractuous adnate to summit of each capitate filament, unequally rimose. Germen 5-locular; ovules ∞, 2-serrate; style elongated, apex stigmatiferous capitate. Fruit (very large) globose, subligneous, sometimes densely conical-muricate, indehiscent, or with difficulty unequally 5-parted, inwardly pulpous; seeds immersed in pulp (arillate?); embryo fleshy; cotyledons thick, often conferruminate.—Trees; leaves entire coriaceous, lepidote beneath, parallel thinly penninerved; flowers in lateral cymes; involucre round each flower sacciform valvate lepidote (simulating exterior calyx), finally irregularly torn[4] (*Ind. Arch. Malaya*[5]). See p. 105.

85. **Cullenia** Wight.[6]—Calyx tubular, 5-dentate. Corolla 0. Stamens ∞; column elongated above, 5-fid; anthers small subglobose, glomerate close to branches of androceum. Germen 5-locular; ovules in each cell 2, ascending; micropyle introrse inferior; style elongated, apex capitate stigmatiferous. Fruit globose densely muricate, finally

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[1] A Genus, in some respects related to *Hampeæ* (Benth.), somewhat recalling *Quaribea* by the bud.

[2] Spec. 1. *S. Spruceana* Benth., *loc. cit.*—Walp., *Ann.*, vii. 417.

[3] *Syst. Nat.*, ed. 13, 581.—Adans., *Fam. des Pl.*, ii. 399.—Lamk., *Dict.*, ii. 333; Suppl., ii. 530; *Ill.*, t. 641.—DC., *Prodr.*, i. 480.—Kœn., in *Trans. Linn. Soc.*, vii. 266, t. 14–16.—Spach, *Suit. à Buffon*, iii. 439.—Endl., *Gen.*, n. 5305.—B. H., *Gen.*, 213, n. 55.

[4] *Lahia* seems to approximate to *Durio*, Hassk., *Hort. Bogor.*, new ed., 99;—B. H., *Gen.*, 213, n. 56), a tree of Bornea unknown to us; described as: flowers encircled by involucre 2, 3-fid; calyx obsolete sub-3-fid, petals 5, staminal filaments ∞, sub-free at apex 2-furcate, finally ∞-antheriferous; anthers free reniform and germen 5-locular; cells ∞-ovulate. Its entire leaves and densely scaly inflorescence also much recalling *Durio*.

[5] Spec. 1, 2. Rumph., *Herb. Amboin.*, i. 99, t. 29.—Wallace, in *Hook. Journ.*, viii. 228.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 167.

[6] *Icon.*, t. 1761, 1762.—B. H., *Gen.*, 212, n. 54.

5-valved ; seeds involute in fleshy aril (?) ; cotyledons of fleshy embryo thick unequal.—A lofty tree ; leaves lepidote beneath (of *Durio*) ; flowers axillary cymose-fasciculate shortly pedunculate ; each encircled by a tubular calyciform valvate sub-3–5-dentate lepidote (deciduous) involucel (*Zeylania*[1]). See p. 105.

86. **Neesia** Bl.[2]—Calyx subglobose or acetabuliform depressed at anthesis, irregularly inflexed 5-lobed, valvate. Petals 5. Stamens ∞, shortly 4–6-adelphous at base ; each filament 1- or more rarely 2-antheriferous. Anthers subglobose, 1-locular confluent in a ring. Germen 5-locular ; ovules in each cell 2 or few, ascending ; micropyle extrorse inferior ; style short, apex subcapitate stigmatiferous. Fruit ovoid ligneous densely muricate, loculicidal 5-valved ; seeds "oblong exarillate ; embryo exalbuminous ; cotyledons flat foliaceous."—Tall trees ; leaves oblong, entire lepidote (nearly of *Durio*) sometimes slightly tomentose beneath ; flowers close to branches, shortly racemose-cymose, each surrounded by a 5-lobed, calyciform, closely adpressed valvate epicalyx ; inflorescence involucrate, calyculate, lepidote (*Java, Malaya*[3]). See p. 105.

87. **Boschia** Korth.[4]—Calyx subglobose or ovoid, finally 4, 5-fid. Petals 5, 6, linear or subspathulate. Stamens ∞ ; 5, 6 exterior ones antherless, simulating petals ; interior subfree or unequally connate at base, some 1-antheriferous, others 2–8-antheriferous ; anthers small subglobose, placed at summit of dilated filaments, apex subporous. Germen 3–6-locular ; ovules in each cell 2–∞, ascending ; micropyle extrorse inferior ; style, elongated, apex stigmatiferous, more or less dilated peltate-discoidal. Fruit ovoid or acuminate ligneous densely muricate, 3–5-valved. Seeds few or ∞, usually oblong, arillate at base ; embryo (albuminous ?), cotyledons flat foliaceous.—Trees ; leaves nearly of *Durio*, lepidote beneath ; flowers[5] close to branches, shortly pedicellate lepidote (together with pedicel and calyces) surrounded by an epicalyx 2–3-fid (*Malaya, Ind. Arch.*[6]). See p. 105.

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[1] Spec. 1. *C. excelsa* Wight, *loc. cit.*—Thw., *Enum. Pl. Zeyl.*, 28.

[2] *Fl. Jav. Præfat.*, vii. ; in *Nov. Act. Nat. Cur.*, xvii. 75, t. 6.—Endl., *Gen.*, n. 5308.—B. H., *Gen.*, 213, n. 58. — *Esenbeckia* Bl., *Bijdr.*, 118 (nec H. B. K.). — *Cotylephora* Meissn., *Gen.*, 36, *Comm.*, 28.

[3] Spec. 2. Miq., *Fl. Ind.-Bat.*, i. p. ii. 168.—Walp., *Rep.*, i. 331.

[4] *Verh. Nat. Gesch.*, 257, t. 69.—B. H., *Gen.*, 213, n. 57.—*Heteropyxis* Griff., *Notul.*, iv. 524, t. 594.

[5] Resembling those of *Tiliaceæ*.

[6] Spec. Walp., *Rep.*, v. 96.

88. **Cœlostegia** Benth.[1]—Flowers small hermaphrodite; receptacle concave obconical, apex expanded 5-saccate ring; calyx inserted at the margin of receptacle (afterwards perigynous[2]), lobes 5, short erect valvate. Petals 5, perigynous, inserted with calyx. Stamens ∞ (of *Boschia*); anthers small globose, sometimes solitary or 2–6 congested. Germen large, partly inferior, immersed in receptacle, 5-locular; ovules 2 or few in each cell, ascending; micropyle extrorse inferior; style filiform, apex peltate, 3-lobed stigmatiferous. Fruit...?—A lofty tree; habit and leaves (of *Boschia*) integerrimus, coriaceous, minutely squamose-lepidote beneath, petiolate; flowers close to branches cymose-fasciculate; each surrounded by short involucre lepidote (together with calyx and pedicels) (*Malaya*[3]). See p. 105.

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[1] *Gen.*, 213, n. 59.

[2] Receptacle regarded as base of calyx cf. Bentham.

[3] Spec. 1. *C. Griffithii* Benth., *loc. cit.*

XXVII. TILIACEÆ.

I. BROWNLOWIA SERIES.

The Limes (Fr., *Les Tilleuls*) (figs. 176, 179–184), which have given their name to this family because they were the only living representatives of it in our country at a certain epoch, have carpels united into a single plurilocular ovary. They are, on the contrary,

Tilia sylvestris.

Fig. 176.
Floriferous branch ($\frac{1}{2}$).

independent of each other in *Brownlowia*[1] and in some other neighbouring types, which are here consequently analogous to the *Sterculieæ* among the *Malvaceæ*. Moreover, *Brownlowia* (fig. 177) has regular hermaphrodite flowers, with a small convex receptacle. It supports a campanulate gamosepalous valvate calyx, whose upper

[1] Roxb., *Pl. Coromand.*, iii. 61, t. 265.—Spach, *Suit. à Buffon*, iv. 43.—Endl., *Gen.*, n. 5374.—H. Bn., in *Payer Fam. Nat.*, 274.—B. H., *Gen.*, 231, n. 1.—Bocq., in *Adansonia*, vii. 59.—*Humea* Roxb., *Fl. Ind.*, ii. 640 (nec. Sm.). Mast., in *Fl. B. Ind.*, 381.

part separates at anthesis into five teeth or five short lobes, or into a number of more or less deep equal or unequal divisions often fewer in number. Close against the calyx, and alternating with its divisions, are inserted five petals, slightly unsymmetrical, tapering at the base, arranged in the bud in contorted or imbricated præfloration. Above them the receptacle takes the form of a short cylindrical column, upon which the gynæceum is placed.

Brownlowia elata.

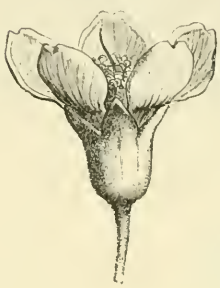

Fig. 177. Flower ($\frac{3}{1}$).

Quite against this, that is to say, at a certain distance from the corolla, the androceum is inserted, composed of ten bundles. Five are oppositipetalous, and each represented by a sterile tongue or elongated petaloid staminode, and five others by phalanges of fertile stamens, free or scarcely united among themselves at the base of their filaments, and with short anthers, whose extrorse cells are almost globular, dehiscing longitudinally by clefts often confluent at the summit. The gynæceum is superior, formed of five or a smaller number of alternipetalous carpels. Each of them has a one-celled ovary touching the adjacent ovaries, but not united with them, tapering above into a subulate style with non-swollen stigmatiferous apex. In the internal angle of the ovary the placenta is seen supporting two ascending anatropous ovules with exterior and inferior[1] micropyle. The fruit is formed of one, or more rarely of several independent almost globular carpels, with thick woolly bivalved monospermous pericarp. The rounded seed, inserted by a large interior hilum, encloses under its glabrous coats a fleshy embryo, whose thick cotyledons are decurrent below their insertion and form a sort of case round the radicle. *Brownlowia* consists of beautiful trees of tropical Asia, besprinkled with scaly or stellate hairs. Three species have been described.[2] Their leaves are alternate, petiolate, simple, penninerved, and 3–5-nerved at the base. The flowers are disposed at the summits of the branches, or in axils of the upper leaves in ramified clusters of cymes.

[1] They have a double coat.

[2] Wall., in *Bot. Reg.*, t. 1472.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 56.—Walp., *Ann.* vii. 442.

Beside this genus are placed six others, having flowers similar in exterior, and only differing from them in some details in the organization of the flower and fruit. *Christiana* (fig. 178) has a fruit of five monospermous follicles,[1] but the seeds have an albumen and the stamens are fertile. *Diplodiscus* has the androceum and carpels of *Brownlowia;* but the latter are united below into a 5-celled ovary. It is the same in *Pentace,* but its indehiscent and monospermous fruit is furnished with from three to five vertical wings. In *Pytiranthe* the ovules are descendent and the fruit is also provided with longitudinal wings but little developed; but it is capsular and five-valved. *Berrya* has the androceum of *Christiana,* and a capsular fruit with three or four valves, but the cells are pluriovulate, and each of them bears in the fruit a pair of vertical ascending wings. Finally, in *Carpodiptera* the flowers are polygamous and diœcious; the ovary cells only contain one descendent ovule each; the style is dilated into a large stigmatiferous, almost petaloid extremity; and the capsule, generally bivalved, is furnished with four vertical wings. All the plants have moreover nearly the same vegetative organs as *Brownlowia.*

Christiana africana.

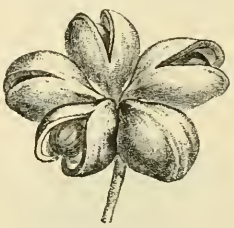

FIG. 178.
Dehiscent fruit.

II. LIME SERIES (Fr., *Tilleuls*).

The Limes[2] (figs. 176, 179–184) have regular hermaphrodite pentamerous flowers. If we examine, for example, those of the Common Lime,[3] we shall see, upon the convex receptacle, five valvate sepals

[1] And in this way they would best represent the type of this series; but in their perianth, until now little known, there is said to be an inequality in the number of the pieces of the calyx and of the corolla. The flower would therefore in this respect be less regular.

[2] *Tilia* T., *Inst.,* 611, t. 381.—L., *Gen.,* n. 660.—ADANS., *Fam. des Pl.,* ii. 382.—J., *Gen.,* 292.—GÆRTN., *Fruct.,* ii. 150, t. 113.—POIR., *Dict.,* vii. 676; Suppl., v. 312.—LAMK., *Ill.,* t. 467.—TURP., in *Dict. Sc. Nat.,* Atl., t. 147.—DC., *Prodr.,* i. 512.—SPACH, *Suit. à Buffon,* iii. 15.—ENDL., *Gen.,* n. 5373.—PAYER, *Organog.,* 20, t. 4.—A. GRAY, *Gen. Ill.,* t. 136.—H. BN., in *Payer Fam. Nat.,* 274.—B. H., *Gen.,* 236, 986, n. 24.—BOCQ., in *Adansonia,* vii. 34.—LEM. & DCNE., *Tr. Gén.,* 340.

[3] *T. sylvestris* DESF., *Cat. Hort. Par.,* 152 (ex SPACH, *Revis. Til.,* 3, n. 1).—*T. ulmifolia* SCOP.—*T. europæa borealis* WAHLENB.—*T. microphylla* VENT., *Diss. Til.,* t. 1, fig. 1 (ex SPACH).—*T. parvifolia* EHRH., *Beitr.,* v. 159.—KOCH., *Syn.,* 145.

and five alternate petals, imbricated in the bud, sessile, but tapering at the base, which in certain species is thickened and glandular. The stamens, indefinite in number, are all nearly free, or obscurely united at the base into five oppositipetalous bundles. The filaments are inserted close against the corolla; their summit is divided into two very short divergent branches, each of which supports a distinct anther-cell, extrorse and dehiscing longitudinally.[1] The free and superior gynæceum, inserted immediately above the stamens, is composed of an ovary with five alternipetalous cells, surmounted by a style slightly dilated, quinquedentate, stigmatiferous at the apex. In each cell, more or less complete,[2] there are two ascending ana-

Tilia sylvestris.

FIG. 179.
Flower ($\frac{9}{1}$).

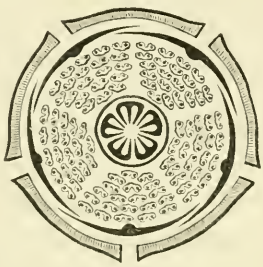

FIG. 180.
Diagram.

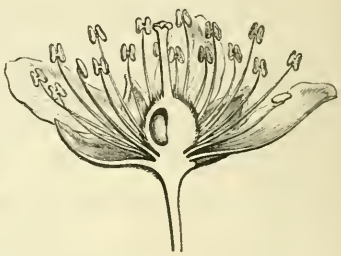

FIG. 181.
Long. sect. of flower.

tropous ovules inserted towards the internal angle, ascendent and anatropous, the micropyle being directed downwards and outwards.[3] The fruit is dry,[4] indehiscent, containing one or a very small number of seeds, which enclose under their coats[5] a fleshy albumen enveloping an embryo with large, superior, foliaceous, lobed[6] cotyledons, whose summit and edges are more or less irregularly incurved and involute.

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[1] The pollen is ellipsoidal, flattened, slightly triangular, with a large halo and a small pore on each face; it differs thus from that of the other *Tiliaceæ* where it is ovoid with three folds, and in water ovoid or spherical with three bands each bearing a papilla. Its external envelope is finely cellulose in *Grewia*, and punctuate in *Elæocarpus*, *Sloanea*, *Luhea*, *Triumfetta*, *Corchorus* and *Sparmannia*. (H. MOHL., in *Ann. Sc. Nat.*, sér. 2, iii. 333.)

[2] The placentas, which are always parietal when young, join sooner or later, more or less completely, according to the axis of the ovary; in this way the upper part is quite different from the lower which has another origin, for it arises directly from the floral axis. (See PAYER, *Organog.*, 24.)

[3] They have two coats.

[4] Or rather its mesocarp is represented at first by a slight fleshy layer, finally becoming dry.

[5] They are three-fold. The testa is thick and crustaceous; its internal edge often bears a large irregular impression (fig. 183).

[6] Digitinerved at the base.

If we take, on the contrary, the flowers of some other species, such as *T. americana, nigra, argentea,* &c., we see, with the same general organization, a difference in the androceum, inasmuch as the upper stamen of each phalanx is transformed into a sterile petaloid lamella, contorted or imbricated in the bud with the other oppositipetalous staminodes.[1] The Limes are trees, often tall, with organs nearly glabrous, or besprinkled with fine, simple or stellate hairs. The leaves are alternate, simple, serrate, often cordate and unsym-

Tilia sylvestris.

FIG. 183.
Seed ($\frac{3}{1}$).

FIG. 182.
Fruits.

FIG. 184.
Long. sect. of seed.

metrical at the base. The petiole is accompanied by two lateral stipules. The flowers[2] are united in racemes terminated by a flower, or in racemes of terminal or axillary cymes.[3] The principal axis of the inflorescence bears several bracts, the lowest of which, much more developed than the others, elongated and foliaceous, remains adnate to the axis for a considerable distance, often nearly to the middle of its height. This genus, in which a great many species[4]

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[1] Sect. *Lindnera* (REICHB., *Consp.*, 299).

[2] White or yellowish, aromatic.

[3] The inflorescence of the Limes has been, says PAYER (*Organog.*, 20), "the object of deep discussion between WYDLER and BRUNNER: the latter maintaining that the cluster of flowers is a prolongation of the principal axis, and that the foliaceous bud to be seen at the base is only a lateral production; the former holding, on the contrary, that the foliaceous bud is the prolongation of the principal axis, and that the cluster of flowers is only a secondary order." The same author has shown that the bud is secondary and that the axis terminated by the flower is the principal. He saw in the species studied by him, seven flowers at a given time in one inflorescence, "one more developed than the others, which terminated the principal axis, and six others, all of the same generation, which are lodged in the axil of two stipulate bracts and their stipules," and decided that "if a greater number are seen afterwards, it is because each of these six flowers is accompanied in its turn by two new bracts, which are sterile or fertile." The bracts are distichous. We find first a large bract, later on back to back with the axis, and always destitute of stipules on the other side, the bract with germeniferous axil which also bears no stipules on its side. The bracts 3 and 4 superposed reciprocally to bracts 1 and 2, are accompanied by two small lateral stipules.

[4] REICHB., *Ic. Fl. Germ.*, vi. 311–324.—

have been described, probably only contains from eight to ten at the most, all natives of the north temperate regions of the two Worlds.

Apeiba Tibourbou.

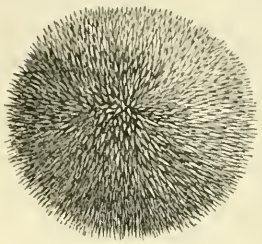

Fig. 185.
Fruit ($\frac{1}{2}$).

Beside the Limes is placed *Schoutenia* and *Muntingia*, which also have indehiscent fruits. In the former it is dry and monospermous, but the calyx is accrescent round it, and forming at the base a kind of large membranous reticulate involucre. In the latter the pericarp surrounds numerous seeds, but it is fleshy. *Glyphæa* has also a dry fruit, indehiscent or nearly so, elongated and polyspermous; the ovary is divided into a variable number of cells: there may be as many as ten. It is the same in *Apeiba;* as many as thirty cells have been counted in the indehiscent fruit (fig. 185); but it is circular, depressed, muricate, or covered with prickles or hairs. In *Ancistrocarpus* the tetramerous flower has an ovary with six incomplete cells, a 5-adelphous androceum, a coriaceous globular fruit covered with hooked prickles (indehiscent?). In *Luhea* the fruit is capsular, dehiscent, with winged seeds, but the exterior stamens are sterile, and the flower is surrounded by a variable number of bracts forming an epicalyx. *Græffea* has also an epicalyx formed only of three valvate leaves, two multiovulate cells in the ovary, and the stamens all fertile. In *Mollia* the epicalyx disappears, the stamens are united for a great distance into ten bundles, superposed five to the sepals and five to the petals, while the capsular fruit remains two-celled. *Sparmannia* (figs. 186–190) and *Entelea* generally have tetramerous flowers. In the former the exterior stamens are sterile, undulate-glandular or moniliform, and the fruit is an almost globose capsule with 4–8 cells, all outwardly bristling with prickles. *Entelea* (fig. 191) has nearly the same flowers and fruit, but all its stamens are fertile. *Honckenya* has a small number of interior fertile stamens, the others being reduced to slender filaments. The fruit is an elongated, echinate, loculicidal capsule, the valves, from four to eight in number,

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Duham., *Arbr.*, i. t. 50–52.—Waldst. & Kit., *Pl. Rar. Hung.*, t. 3.—Venten., *Monogr. Til.*, Paris (1802), in-4.—Spach, *Rev. Gen. Til.*, in *Ann. Sc. Nat.*, sér. 2, iii. 331, t. 15.—Gren. & Godr., *Fl. de Fr.*, i. 285.—A. Gray, *Man.*, ed. 5, 103.—C. Koch, *Bot. W. Schr.* (1865), 267, 277.—Walp., *Rep.*, i. 357; ii. 799; *Ann.*, vii. 449.

having transverse false partitions between the seeds. *Corchorus* (figs. 192–194) has the same flowers as *Honckenya*, but generally of

Sparmannia africana.

FIG. 186.
Floriferous branch ($\frac{2}{3}$).

FIG. 189.
Seed ($\frac{5}{1}$).

FIG. 188.
Fertile stamen ($\frac{5}{1}$).

FIG. 190.
Long. section of seed.

smaller dimensions. All the stamens are fertile in most cases, and the anthers, at first introrse, remain so until the end, or their upper extremity or even both are reflexed and finally look towards the exterior side of the flower (fig. 193).

In certain species of the genus *Corchorus* the number of stamens is definite, or nearly so. There

Sparmannia africana.

FIG. 187.
Longitudinal section of flower ($\frac{3}{1}$).

are, for example, four or five superposed to the sepals and a like number alternate. In a Japanese species, the type of the genus *Corchoropsis*, the stamens with anthers definitely extrorse are not only limited in number, five among them being superposed to the sepals and five or sometimes ten to the petals; but five of the most interior stamens superposed to the petals become sterile, petaloid, with the form of subspathulate tongues. But it is not more necessary to generically distinguish this species from *Corchorus* than it seems to be to separate from the other Limes those species of this latter genus which have petaloid plates within the fertile stamens.

Entelea arborescens.

Fig. 191. Flower.

Another extremely variable character in the genus *Corchorus* is the form of the fruit. This is generally elongated and siliquiform, the cells having single cavities; but sometimes it becomes short, even globular, or nearly so, and its cells may be divided by false partitions into demi-cells, or into small secondary cells which separate the seeds one from another.

Corchorus nitens.

Fig. 192. Flower.

The form of the floral receptacle is variable in this genus. Most generally it is raised but very little above the insertion of the perianth, so that the stamens are inserted almost on a level with it. But in a certain number of species, generally inseparable however from the others, as *C. hirsutus* (fig. 193), the receptacle, after bearing the corolla, is elevated in the form of a cylindrical column, the summit being dilated into a kind of flattened capital or circular disk, upon which the gynæceum is placed, surrounded by the insertion of the stamens. It is by this character that the genus *Corchorus* intimately connects the preceding types with those which, like *Grewia* and other genera, that we shall now proceed to study, and which have been united into the section of *Grewieæ*, believed to be especially characterized by this particular form of the receptacle, and in which the

Corchorus hirsutus.

Fig. 193. Flower, without the perianth ($\frac{3}{1}$).

interval between the insertion of the corolla and that of the androceum is generally pretty considerable. This singular form of the receptacle, causing the insertion of the stamens to be separated from that of the petals by a kind of internode with summit more or less dilated and often covered by a glandular disc, is particularly noticeable in *Grewia* (figs. 195, 196), and it is for this reason that this genus has been made the type of a series which it is impossible for us to preserve as distinct after what we have just seen in *Corchorus*. It is only artificially that we can make a subseries *Grewieæ*. *Grewia* has a drupaceous indehiscent fruit, entire or more or less deeply lobed. In *Desplatsia* and *Duboscia* it is also indehiscent, but suberose-ligneous, ovoid, and with four or five cells in the former, almost globular, with prominent ribs, and more numerous cells (from eight to ten) in the latter. In *Columbia* the fruit is dry and provided with from three to five vertical wings. Sometimes it is completely indehiscent, its wings remaining intact; sometimes, on the contrary, it is divided into two indehiscent shells, so that each of the wings cloven in two through its thickness leaves one of its halves upon each edge of the carpels. In *Trichospermum*, which derives its

Corchorus olitorius.

Fig. 194.
Dehiscent fruit ($\frac{4}{1}$).

Grewia paniculata.

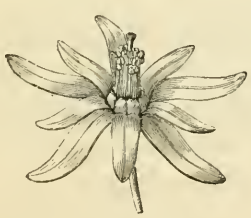

Fig. 195.
Flower.

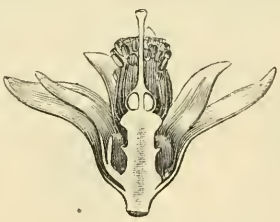

Fig. 196.
Longitudinal section of flower.

name from the hairs with which the seeds are covered, the fruit is dry, smooth, but capsular, two-celled and loculicidal, wider than it is long, and compressed perpendicularly to the partition. The pericarp remains dry in *Erinocarpus* and *Triumfetta*, but its exterior is covered

with prickles or bristling with hairs. In the former of these genera it does not open, and presents nearly the form of a triangular pyramid, the edges of which are prolonged in longitudinal wings, and the surfaces muricate. *Triumfetta* has a globular or slightly triangular fruit, or two-celled and compressed parallel to the partition, and quite covered with hairs more or less rigid, sometimes ciliate or feathery. Sometimes it is indehiscent, sometimes, on the contrary, the cells separate from each other or open incompletely by their midrib. It is seen that all these genera are distinguished by the character of their fruit. They could not be so by their flowers, for all have really the same calyx and the same gynæceum, and all have valvate petals, the base moulding itself upon the faces of the internodes interposed to the androceum and the corolla, and presenting at this height a more or less concave and glandular plate, often edged with a fine down. This organ becomes little noticeable in *Vasivæa*, and only exists in the male flowers, for in these the androceum is borne by a short column, but at some distance from the corolla, while the gynæceum is nearly sessile in the female flower. By the separation of the sexes on different stalks this genus recalls *Cardiodiptera*, the dicœcious type of *Brownlowieæ*, to which the other characters are mostly very analogous.

III. PROCKIA SERIES.

Prockia[1] (figs. 197, 198) have regular hermaphrodite flowers, rarely constructed upon four or five part types, generally upon the three part. In the latter case the slightly convex receptacle bears first three free sepals, valvate-reduplicate in the bud. Then come three alternate petals of nearly the same consistence and colour as the sepals, large, imbricated in the bud, or only represented by narrow tongues not even touching by

Prockia crucis.

FIG. 197. Flower ($\frac{2}{1}$).

FIG. 198. Long. sect. of flower.

[1] P. BR., ex L., *Gen.*, n. 647.—ADANS., *Fam. des Pl.*, ii. 422.—J., *Gen.*, 340.—LAMK., *Dict.*, v. 625; *Ill.*, t. 465.—DC., *Prodr.*, i. 260.—ENDL., *Gen.*, n. 5072.—CLOS., in *Ann. Sc. Nat.*,

their edges. All or part of them are sometimes wanting. The androceum is formed of an indefinite number of hypogynous stamens, with free filaments and two-celled anthers, extrorse, or partly introrse, dehiscing by two longitudinal clefts. The gynæceum is composed of a free ovary, and surmounted by a simple, entire style with stigmatiferous scarcely dilated apex. The ovary contains three oppositipetalous cells, or from four to six cells, in the internal angle of which a large descending bilobed placenta is seen loaded with anatropous ovules. The fruit is a polyspermous berry, accompanied at the base by the persistent calyx; and the seeds lodged in a fleshy pulp, contain under their resistant coats a fleshy albumen surrounding a straight embryo, with thick cotyledons a little larger than the radicle. *Prockia* also consists of shrubs of tropical America, of which five or six species[1] have been described. The leaves are alternate, often dentate like a saw, multinerved at the base, accompanied by two lateral stipules. The flowers are terminal, disposed in simple racemes, or in racemose cymes.

After *Prockia* we range *Hasseltia*, which has very similar flowers in four or five parts, and an ovary with two or three cells, each having in its internal angle a placenta covered outwardly with numerous ovules; *Plagiopteron* having biovulate ovary cells and a fruit in the shape of a reversed triangular pyramid, surmounted by three horizontal rings; and *Solmsia*, apetalous diclinous flowers, with an indefinite number of stamens, sterile in the female flower.

IV. ELÆOCARPUS SERIES.

The flowers of *Elæocarpus*[2] are hermaphrodite, or more rarely unisexual, pentamerous or less frequently tetramerous. If we study

sér. 4, viii. 268.—B. H., *Gen.*, 237, 986, n. 29.—Bocq., in *Adansonia*, vii. 41.—*Trilix* L., *Mantiss.*, ii. n. 1313.—Endl., *Gen.*, n. 5381.—*Jacquinia* Mut., mss. (ex Endl., nec *alior.*)—*Tinea* Spreng., *N. Entd.*, ii. 165.—Lamk., *Ill.*, t. 465, figs. 1–3.—*Kelletia* Seem., *Voy. Her., Bot.*, 85, 254.

[1] "Spec. 2 v. 3, nisi omn. *P. crucis* var." (B. H., *Gen.*, 238). Vahl, *Symb.*, iii. 69, t. 64.—Hook., *Icon.*, t. 94.—Benn., *Pl. Jav. Rar.*, 191.—Griseb., *Veg. d. Kar. Ins.*, 17 (*Banara*); *Fl. Brit. W.-Ind.*, 21 (*Trilix*).—Karst., *Fl Columb.*, 79, t. 111.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 355.—Walp., *Ann.*, vii. 451.

[2] L., *Gen.*, n. 663.—J., *Gen.*, 258.—Gærtn., *Fruct.*, i. 202, t. 43.—Lamk., *Dict.*, ii. 603; Suppl., ii. 703; *Ill.*, t. 459.—DC., *Prodr.*, i. 519.—Turp., in *Dict. Sc. Nat.*, Atl., t. 148.—Endl., *Gen.*, n. 5384.—H. Bn., in *Adansonia*,

first those of some of the few species cultivated in our greenhouses, such as *E. cyaneus* (figs. 199–201), we shall see that their receptacle is convex and considerably elongated. It bears in succession five pointed sepals, valvate in the bud, five alternate petals, induplicate in the bud, furnished inside the base with a small, glandular, laciniate projection unequally cut towards the summit. Above the perianth the receptacle is raised a little in the form of a short column, thickened in the upper part into a circular, glandular, crenate, mammæform disk, above which the stamens are inserted. These are super-

Elæocarpus cyaneus.

FIG. 199.
Bud ($\frac{3}{1}$).

FIG. 200.
Diagram.

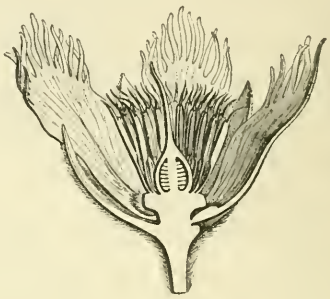

FIG. 201.
Long. section of flower ($\frac{3}{1}$).

posed in phalanges to the petals in the concavity of which they are found lodged in the bud;[1] each phalanx is composed of seven or eight stamens, with free filaments, and two-celled anthers, whose linear cells are surmounted by a pointed prolongation of the connective, within which they open in their upper part only, by two short clefts, confluent at the upper extremity.[2] Within the stamens the apex of the receptacle bears the gynæceum, formed of an ovary with two incomplete cells, each containing an indefinite number of anatro-

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ii. 25; in *Payer Fam. Nat.*, 277.—B. H., *Gen.*, 239, 987, n. 38.—BOCQ., in *Adansonia*, vii. 52. —LEM. & DCNE., *Tr. Gén.*, 341.—*Ganitrus* GÆRTN., *Fruct.*, ii. 271, t. 139.—*Dicera* FORST., *Char. Gen.*, 79, t. 40.—DC., *Prodr.*, 1. 520.—*Craspedum* LOUR., *Fl. Cochinch.*, 336.—*Adenodus* LOUR., *loc. cit.*, 294.—*Lochneria* SCOP., *Introd.*, 1232.—*Aceratium* DC., *Prodr.*, i. 529. —*Acronodia* BL., *Bijdr.*, 123. — *Acrozus* SPRENG., *Syst. Cur. Post.*, 149.—*Monocera* JACK, *Mal. Misc.* (ex HOOK., *Bot. Misc.*, ii. 85).—WIGHT & ARN., *Prodr.*, i. 83.—ENDL., *Gen.*, n. 5387.—*Beythea* ENDL., *Gen.*, n. 5386.—*Perinkara* ADANS., *Fam. des Pl.*, ii. 447. *Sikkimensis* and *glabrescens*.—MAST. *Fl. B. Ind.*, ii. 403.

[1] In many other species, there is besides, a stamen in the interval of each bundle, that is to say, opposite each sepal.

[2] These clefts are generally slightly introrse, sometimes quite lateral.

pous ovules inserted towards the internal angle,[1] surmounted by a subulate style, with simple stigmatiferous extremity. The fruit is an almost globular or elongated[2] drupe with a hard rugose stone

Antholoma montana.

FIG. 203.
Flower.

FIG. 202.
Bud.

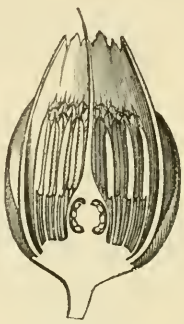

FIG. 204.
Longitudinal section of flower.

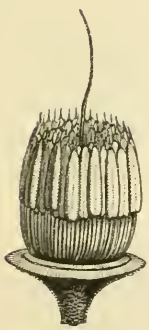

FIG. 205.
Flower, without the perianth ($\frac{2}{1}$).

FIG. 206.
Stamen ($\frac{4}{1}$).

FIG. 207.
Gynæceum ($\frac{8}{1}$).

containing a single seed, whose fleshy albumen surrounds an embryo with flat cotyledons, tolerably large, and more or less undulate.

In the other species of *Elæocarpus*, the receptacle becomes very short, thick and surbased; so that the insertion of the androceum is

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[1] They have a double coat.

[2] It seems that it ought to be very long and fusiform in *Cerea* (DUP.-TH., mss.), of the Mascarene islands, which we have only seen when young, and whose flower moreover is quite like that of the other species of *Elæocarpus*.

very near that of the corolla, only being separated from it by a narrow glandular cushion. The sepals may be slightly imbricated; and the petals, sometimes thick and coriaceous, may be but little cut, or even entire at the summit, sometimes covered with silky hairs. The stamens are sometimes muticous; the number of the ovary cells, often incomplete, may rise to three, four or five; and each one can only contain two ascending ovules, with exterior and inferior micropyle. In the fruit, the wrinkles of the endocarp, which is generally very hard, woody or bony, may become so deep as to appear carved. The number of the cells contained in the stone may be from two to five, generally monospermous, the fertile seed being either ascending or descending, and the others aborting early. *Elæocarpus* consists of trees or shrubs, hitherto only observed in the warm regions of Asia, Oceania, and in the tropical islands of eastern Africa. The leaves are alternate or rarely opposite, entire or dentate, generally accompanied by two small lateral stipules.[1] The flowers are axillary or terminal, usually arranged in racemes, and each placed in the axil of a bract, with two lateral bractlets. Some sixty species are known.[2]

Beside *Elæocarpus* is found *Crinodendron*, which only differs from it essentially by the consistence of the capsular fruit. These two genera represent the *Elæocarpeæ* proper, in which the receptacle displays, between the insertion of the androceum and that of the perianth, a more or less considerable elongation, the surface being furnished with a layer of glandular tissue of greater or lesser thickness. *Sloanea* has given its name to another group, or subseries, in which, on the contrary, the receptacle is not at all elevated between the insertion of the corolla and the stamens; or it takes the form of a cushion or of a thick dome, in the infractuous parts of which the stamens are inserted. Beside *Vallea* is placed, only differing from it very slightly; it has thin three-lobed petals,

[1] Sometimes the limb is black punctuate in its lower part.

[2] Cav., *Icon.*, t. 501.—Wight & Arn., *Prodr.*, i. 83.—Wight, *Ill.*, t. 35; *Icon.*, t. 46, 61–66, 205, 952.—Coll., *Hort. Rip.*, t. 30. (*Eriostemon*). — Hook. & Arn., *Voy. Beech., Bot.*, t. 24, 53.—Hook., *Icon.*, t. 154, 155, 602. —Raoul., *Ch. de Pl. Nouv.-Zél.*, t. 25.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 307; Suppl., i. 406.—Turcz., in *Bull. Mosc.* (1858), i. 235.—Benth., *Fl. Austral.*, i. 280.—Seem., in *Bonplandia*, x. 154, 295; *Fl. Vit.*, 27, t. 78.—A. Gray, *Amer. Expl. Exped., Bot.*, 202.—Ad. Br. & Gr., in *Bull. Soc. Bot. de Fr.*, viii. 201; in *Ann. Sc. Nat.*, sér. 5, i. 355.—Walp., *Rep.*, i. 363, 364; ii. 800; v. 120, 121; *Ann.*, i. 112, 959; ii. 173; iv. 330; vii. 455.

imbricated in two series, with a muricate capsular fruit; *Antholoma* (figs. 202–207), having a gamopetalous corolla in the form of a truncate cone, or of a slightly quadrangular pyramid, with an upper dentate orifice, and a smooth, capsular fruit, irregularly dehiscing at maturity.

Aristotelia (figs. 208–210) forms a third subseries, characterized

Aristotelia Maqui.

Fig. 208.
Floriferous branch.

Fig. 209.
Flower ($\frac{5}{1}$).

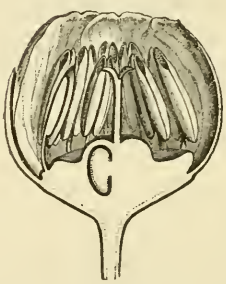

Fig. 210.
Long. section of flower.

by the form of the receptacle representing a porringer, lined by a glandular disk, at the bottom of which the gynæceum is inserted, while the perianth and androceum are perigynous (fig. 210). The number of ovules is certain, and the fruit is a berry. It consists of shrubs, the leaves being generally opposite.

B. de Jussieu had, in 1759,[1] distinguished an order *Tiliæ;* but this was a heterogeneous assembly, which besides the Limes, only

[1] In *A. L. Juss. Gen.*, lxviii.

included three of the genera which we have just described (*Grewia*, *Triumfetta*, and *Corchorus*), with the Teas (Fr., *Thés*), Arnattos (Fr., *Roucouyers*), Magnolias, *Helicteres* and *Tribulus*. Adanson[1] divided his order of Limes into two sections, of which the first included those of our *Tiliaceæ* known in his time, together with some *Buettnerieæ*, and *Bixa*. Unhappily, A. L. de Jussieu,[2] returning to the errors of his uncle, and even making them worse, assembled in *Tiliaceæ* some *Hermannieæ* and *Ternstræmiaceæ*, such as *Stewartia*, most of the *Bixaceæ* and the *Samydeæ* described at that time. He was constrained in 1819[3] to modify the limits of *Tiliaceæ*, and to separate from them *Hermannieæ* and *Flacourtia;* but he still left there a great many strange genera. At the same time he distinguished some genera as having elongated anthers and others as having short ones. These became in the classification of De Candolle[4] the order *Elæocarpeæ*,[5] with the *Tiliaceæ* proper comprising seventeen genera, which we have maintained as distinct, that is to say: *Sparmannia*, *Corchorus*, *Honckenya*, *Triumfetta*, *Grewia*, *Columbia*, *Tilia*, *Muntingia*, *Apeiba*, *Sloanea*, *Christiana*, *Luhea*, *Berrya*, *Elæocarpus*, *Aristotelia* (*Friesia*), *Vallea*, *Crinodendron* (*Tricuspidaria*), besides the genera doubly employed, with *Gyrostemon*, a *Dipterocarpeæ: Vatica*, and doubtfully *Abatia*. Endlicher[6] added, in 1838, *Hasseltia* of Kunth,[7] *Mollia* of Martius,[8] *Entelea* of R. Brown,[9] *Prockia* (*Trilix*) of Linnæus, and *Brownlowia* of Roxburgh.[10] After that Korthals established the genus *Schoutenia*, and Blume *Trichospermum*. Finally the following genera were published: *Diplodiscus*, by Turczaninow,[11] and *Pentace*, by Hasskarl.[12] In England the genera *Glyphæa*,[13] *Plagiopteron*,[14] *Erinocarpus*,[15] *Pityranthe*,[16] *Carpodiptera*,[17] *Græffea*,[18] and *Ancistrocarpus*,[19] were described. The genus *Antholoma* of Labillardière[20] was definitely connected[21] with *Tiliaceæ*. M. Bocquillon, in a special work[22] upon this family, added the

[1] *Fam. des Pl.*, ii. 378, ord. 48.
[2] *Gen.*, 289, ord. 19.
[3] In *Mém. Mus.*, v. 233.
[4] *Prodr.*, i. (1824), ord. 27.
[5] *Op. cit.*, 519, ord. 28.
[6] *Gen.*, 1004, ord. 212.
[7] *Nov. Gen. et Spec.*, vii. (1825).
[8] *Nov. Gen. et Spec.*, i. (1824).
[9] In *Bot. Mag.*, t. 2480 (1824).
[10] *Pl. Coromand.*, iii. (1819).
[11] In *Bull. Mosc.* (1858).
[12] *Hort. Bogor.*, i. ed. 1858.
[13] *Niger*, 237 (1849).
[14] Griff., in *Calc. Journ.*, iv. (1844).
[15] Nimmo, ex Hassk., *Retzia* (1855).
[16] *Enum. Pl. Zeyl.* (1864).
[17] In *Mem. Amer. Acad.*, viii. (1860).
[18] Seem., *Fl. Vit.* (1865).
[19] Oliv., in *Journ. Linn. Soc.*, ix. (1867).
[20] See (1799).
[21] Pl., in *Ann. Sc. Nat.*, sér., 4, ii. 260 (1854).—H. Bn., in *Adansonia*, ii. 26 (1861).
[22] *Mém. sur le Gr. des Tiliacées*, in *Adansonia*, vii. 16 (1866). This memoir commenced

African genera *Desplatsia* and *Duboscia;* and we have made the total number of distinct genera thirty-eight, in describing recently the two exceptional types *Solmsia*[1] and *Vasivæa*.[2]

The latest authors who have completely studied this group, Bentham and Hooker,[3] have divided it into seven tribes,[4] which we have thought necessary to reduce to four, by uniting two and two, those which are only founded upon the difference of form presented by the internodes of the receptacle, in the interval which separates the insertion of the corolla from that of the androceum.[5] The special character of these series consequently become the following :—

I. Brownlowieæ. — Calyx gamosepalous, campanulate, with three, four or five valvate divisions. Internodes little developed or wanting in the interval of the petals and the androceum. Petals coloured. Anthers short, generally globular or didymous, with the lines of dehiscence confluent at the summit.—(7 genera.)

II. Tilieæ.—Calyx with distinct sepals. Petals coloured, inserted against the stamens[6] or separated from their insertion by a more or less elongated internode, glandular in its upper portion, and in this case furnished within their base with a dimple or plate, which moulds itself upon a corresponding face of the receptacle.[7]—(21 genera.)

III. Prockieæ.—Calyx with distinct sepals. Petals not at all, or but little developed, sepaloid, often in the form of tongues or teeth. Anthers short, subglobular or didymous, dehiscing by longitudinal clefts.—(4 genera.)

IV. Elæocarpeæ.—Calyx valvate, or more rarely imbricated. Petals wanting or incised, lobed. Anthers linear, dehiscing from the summit for a variable distance, often inconsiderable. Andro-

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by an almost complete picture of the history of this family. *Tiliaceæ* is there divided into eleven sections, whose differential characters do not seem to us sufficiently indicated to preserve them as distinct. On the other hand, *Mollia* and *Trichospermum* are separated from it in order to be connected with *Bixaceæ*, while *Belotia* is kept among the *Tiliaceæ;* and although *Berrya* forms there a section of these latter, *Brownlowia, Pentace, Pityranthe,* and *Christiana* are rejected and placed among the *Sterculiaceæ*, where we have not been able to leave them.

[1] In *Adansonia*, x. 34 (1871).

[2] *Loc. cit.*, 19 (1872).

[3] *Gen.*, 228, ord. 33.

[4] Viz., *Brownlowiæ, Grewieæ, Tilieæ,* and *Apeibeæ* (forming by their union a first series of *Holopetaleæ*); *Prockieæ, Sloaneæ,* and *Elæocarpeæ* (which together form the series *Heteropetaleæ*).

[5] See, relative to the value of this character, *Adansonia*, x. 191.

[6] Character particular to the subseries *Eutilieæ.*

[7] This is the characteristic of *Grewieæ*, which cannot always be certainly distinguished from the preceding.

ceum inserted quite against the corolla[1] or separated from the insertion of the petals by a more or less elevated internode, glandular towards its summit.[2]—(6 genera.)

All have common characters, of which the principal ones serve to distinguish the *Tiliaceæ* (rather artificially) from the families most nearly related to them, that is to say, *Malvaceæ* (comprising the *Sterculieæ* and *Buettnericæ*) and *Dipterocarpaceæ*, *Chlenaceæ*, *Bixaceæ*, and *Ternstræmiaceæ*. It is certainly too absolute, but it is frequently correct to say that *Tiliaceæ* differs from *Malvaceæ*,[3] by its stamens, generally free, or scarcely monadelphous or polyadelphous at the base,[4] from *Malveæ*, *Hibisceæ*, *Bombaceæ*, &c., by its two-celled anthers, and inasmuch as the descending ovules, with ventral raphe, which are often observed in the *Tiliaceæ*, are scarcely ever met with among the *Malvaceæ*.[5] It is true, almost within the same limit, to say the *Bixaceæ* and the *Samydeæ*, very similar to the *Tiliaceæ*, are separated from them by their parietal placentation.[6] The præfloration of the calyx also suffices almost always to distinguish the *Tiliaceæ* from the *Dipterocarpaceæ*, where it is generally imbricated,[7] and from the *Chlenaceæ*, which are characterized by a sort of disk in the form of a circular enclosure, within which the stamens are inserted, and by the involucre, by which the flowers are surrounded. The *Ternstræmiaceæ*, scarcely separable from the *Tiliaceæ*, have also a calyx imbricated[8] at præfloration. But we must say that if we were not obliged to have recourse to artificial modes of distinction to render study possible, none of the types could be logically separated into absolutely distinct groups.

By what is known of the histological organization of the *Tiliaceæ* they approach very nearly the vast group *Malvaceæ*, as we have defined it. The structure of the wood of the Limes (*Tilia*) is one of those which has often been taken as a type among dicotyledonous

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[1] Mode of insertion which belongs particularly to the subseries *Sloaneæ*.

[2] Character which only serves imperfectly to separate the subseries of *Elæocarpeæ* proper from the preceding.

[3] Kunth (*Malvac.*, 14) admits in one and the same group with equal title, three large families; *Malvaceæ*, *Buettneriaceæ*, and *Tiliaceæ*, and distinguishes these last from the preceding by their two-celled introrse anthers; a character evidently much too absolute.

[4] In *Mollia*, a genus nearly allied to the *Malvaceæ*, the polyadelphous character exists for a great distance.

[5] But it has generally, especially in the *Brownlowia* series, descending ovules with ventral raphe. (See Bocq., in *Adansonia*, vii. 63.)

[6] The *Tiliaceæ* have very frequently incomplete cells. (See *Adansonia*, vi. 238; vii. 63; x. 192.)

[7] It is, however, well known that the imbrication of the calyx is very pronounced in *Echinocarpus*, generically inseparable from *Sloanea*.

[8] See *Adansonia*, x. 34.

trees; their liber also, on account of its great development and peculiarities, which render it solid and more or less textile, has often been studied and described.[1] The fascicles which constitute it are undulate and tangential between themselves, to the level of the summit of their most marked curvature, and they are more abundant, as the layers of liber are nearer the interior.[2] The parenchyma is often the seat of abundant mucilaginous deposits, and here, as in a great many *Malvaceæ*, we meet with special mucilaginous cells, in which there may be "the procreation of other cells, having their own stratification,"[3] and the plasma of mucilage may offer two aspects: "sometimes it spreads itself round the cells, and separates afterwards into more or less numerous strata; sometimes it fills the whole cavity, and produces strata separating from the circumference to the centre." The particular cells in the middle of the mucilaginous liquid may in *Tilia corallina* give birth to nuclei, at first homogeneous, afterwards hollowed into a central cavity. From these facts Trécul has concluded that in the Limes, as in many other *Malvoïdeæ*, the mucilage "does not result from a metamorphosis of the cellular membranes."

At most about three hundred and fifty species are known, of which two-thirds belong to the Old World. The *Brownlowieæ* series, formed of fourteen or fifteen species, would belong entirely to the tropical regions of the Old World if it did not contain two American *Carpodipteras*. The *Prockieæ*, on the contrary, are natives of tropical America, except *Plagiopteron*, which can only doubtfully be said to belong to these, and which is Indian. All the species of *Elæocarpus* belong to the warm regions of the Old World; and all the *Sloaneas* were formerly American; but it is necessary to associate with this genus the Asiatic and Oceanic species with imbricated calyx, composing the section *Echinocarpus*. All the species of *Crinodendron* were

[1] Upon these questions see Kieser, *Mem. upon the Orig. of Plt.* (1814), t. 17.—Mirb., *The Orig. of Liber and Wood* [in *Mém. Mus.* (1828), xvi. 26, fig.]; *Elém. de Phys. Vég.*, t. xiv. 19, 20.—H. Mohl., *Ueb. d. Bau d. Por. Gef. des Dicot.* (in *Abh. Akad. Wissensch. Münch.*, i. 445, fig.); in *Bot. Zeit.* (1855), 878.—Link., *Ic. Sel.* (1840), fasc. 2, ii. 7, 12.—C. H. Schultz, *Die Cyclose* [in *Nov. Act. Nat. Cur.* (1841), xviii. Suppl., ii. t. 33]. — Schacht, *Lehrbuch*, i. 338; *Der Baum*, 95, 199. — Henfr., *Micr. Dict.*, art. *Wood*.—Oliv., *Stem in Dicot.*, 8.

[2] See Rich., *Elém.*, éd. 7, 114, fig. 62.

[3] Trécul, in *Adansonia*, vii. 248. Meyen believed the mucilage of the Limes to be contained in the intercellular channels.

Chilian ; but the three species of the section *Dubouzetia* grow in New Caledonia. In this way this genus is nearly like *Aristotelia*, represented by one species in Chili, a second in Australia, and by two others in New Zealand. *Vallea* is confined to the western zone of South America, and *Antholoma* to New Caledonia. On the contrary, *Trichospermum*, comprising *T. mexicanum*,[1] should be represented by an American species, a Javanese, and a third, *Diclidocarpus*, observed in the Fiji isles. *Apeiba*, *Mollia*, *Muntingia*, *Luhea*, are all American, while *Christiana*, *Honckenya*, *Sparmannia*, *Glyphæa*, *Duboscia*, *Desplatsia*, *Ancistrocarpus*, have only been observed in Africa ; *Erinocarpus*, *Columbia*, *Diplodiscus*, *Berrya*, *Brownlowia*, *Pentace*, *Pityranthe*, *Schoutenia*, in tropical Asia only, and in the neighbouring oceanic regions. *Græffea* is limited to the islands of Fiji ; *Entelea* to New Zealand. The Limes are met with in both Worlds, but only in the temperate regions of the northern hemisphere. *Grewia* is spread all over the warm regions of the Old World, but is not met with in America. The two most widely spread genera are without doubt *Corchorus* and *Triumfetta ;* for there is scarcely a warm region in the world where they do not grow more or less abundantly.

Their uses,[2] not very numerous, also indicate a great analogy to *Malvaceæ*. Like them the *Tiliaceæ* are also remarkable for the production of mucilage, for the textile qualities of their liber fibres, and often by a certain degree of astringency due to the development of tannin or substances analogous to it. The mucilaginous decoctions obtained from the internal bark, and occasionally from the leaves and flowers of the Lime,[3] are used as emollients and pectorals. *Tilia sylvestris* (figs. 176, 179–184), and with it *T. grandiflora* Ehr., and *parviflora* Ehr., in Western Europe ; in Hungary, *T. argentia*, Desf. ; in America, *T. americana* L., and the other species of the same country are most frequently used in the same way.[4] At the Cape the *Sparmannia africana* L. (figs. 186–190) ; in the Antilles, *Muntingia*, *Cala-*

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[1] *Grewia mexicana* DC., *Prodr.*, i. 510, n. 18.—*Belotia grewiæfolia* A. Rich., *Fl. Cub.*, i. 207, t. 21.—*Adenodiscus mexicanus* Turcz., in *Bull. Mosc.* (1846), ii. 504.

[2] Endl., *Enchirid.*, 524.—Lindl., *Fl. Med.*, 147 ; *Veg. Kingd.*, 372.—Rosenth., *Syn. Pl. Diaphor.*, 728, 1148.

[3] Guib., *Drog. Simpl.*, éd. 6, iii. 634, fig. 740.—Rév., in *Fl. Méd. of the 19th Century*, iii. 408.

[4] There are also quoted the species and varieties named *T. vulgaris* Hayn., *ulmifolia* Scop., *heterophylla* Vent., *T. canadensis* Michx., *caroliniana* Mill., *mexicana* Schltl. syn. (?) of *T. americana*. (See Rosenth., *op. cit.*, 732.—Berg. & Schm., *Off. Gew.*, iii. t. 18 b.).

bura L.; in all the warm regions of the globe a great many *Triumfettas*[1] and herbaceous species of *Corchorus* have the same reputation. These last, rich in water or in syrup of a gummy consistence, and without other flavour than that given to them by various sauces, are used as vegetables under the name of *Coretes*, like our spinage and lettuce; such are principally *C. olitorius* L. (fig. 194), *acutangulus* L., *tridens* L., *capsularis* L., *depressus*,[2] &c. The flowers are often slightly odoriferous in the preceding genera; those of the Limes have a soft fragrance, often ethereal. The bees pillage them of an aromatic juice much used in medicine, in infusions, in distilled waters, as digestives, diaphoretics, sedatives, and antispasmodics. In *Grewia* the fruit is often partly fleshy and edible, sweet and acidulate, sometimes employed[3] in tropical countries in the preparation of cooling drinks and sherbet. The flesh of several Asiatic[4] species of *Elæocarpus* have the same reputation; it is eaten alone, or confected with sugar. But in most of the species of the two last genera the leaves are astringent, and the bark tonic, aromatic, or bitter, containing a certain amount of tannin. In Asia *Grewia Microcos* L. and *orientalis* L., are also valued as astringents.[5]

Some species serve, for the same reason, in the preparation of skins and leather. In Brazil, the *Luheas* are used in the same way.[6] In the Limes themselves, the bracts which accompany the flowers are considered to give to the infusions a slight degree of astringency.[7] Several American species of *Triumfetta*[8] are both astringent and muci-

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[1] Especially *T. angulata* LAMK., in India and Tropical Africa; in Java, *T. annua* L., *spicata* BL., *pseudo-angulata* BL.; in India, *T. pilosa* ROTH, *oblongata* LAMK., *trilocularis* ROXB.; in America, *T. havannensis* H. B. K. and *altheoides* LAMK.

[2] *C. Antichorus* RŒUSCH (ex DC. — *Antichorus depressus* L. FIL., *Mantiss.*, 64.—DC., *Prodr.*, i. 504.—*Jussiæa edulis* FORSK., *Ægarab.*, 210.—*Carrictera* SCOP.

[3] Among others, those of *G. asiatica* L., *sapida* ROXB., *hirsuta* VAHL, *tiliæfolia* VAHL, in India; of *G. megalocarpa* P. BEAUV., in Guinea. In Abyssinia those of *G. echinulata* DEL., and of *G. discolor* FRES. (vulg. *Somaya*) are eaten. Those of a *Grewia*, named in the country *Matangourré*, are astringent and used in making ink.

[4] Especially *E. Ganitrus* ROXB., *serratus* L., *Perim-kara* DC. *Tulpai* of India), *lanceolatus* BL., *tuberculatus* ROXB., *tectorius* (*Craspedum tectorium* LOUR.), *macrophyllus* BL. (*Ganitrus oblongum* RUMPH.), *angustifolius* BL., and *E. cyaneus* SIMS (figs. 199–201), Australian species (see ROSENTH., *op. cit.*, 733, 1148). The *Andjang-annjanc* of India, a plant with oleaginous seeds, is an *Elæocarpus*.

[5] *G. columnaris* SM., and *asiatica* L., are distinguished as such; the latter is valued as an antisyphilitic. In Abyssinia some species are used as astringents.

[6] Principally *L. paniculata* MART. and *Azoite cavallos*, that is to say, *L. grandiflora* MART. and *divaricata* MART. The former is used in making gun stocks; the two latter furnish crooks used in keeping sheep.

[7] "Flores..., dum infunduntur, a bracteis validius adstringentibus caule separandi." (ENDL., *loc. cit.*)

[8] Principally *T. semitriloba* L., *sepium*

laginous. The fleshy fruits of *Aristotelia Maqui* (figs. 208–210)[1] are eaten in Chili, and also used in making a kind of wine. In spite of the generic name of *Elæocarpus*, it is a mistake to say that the pericarp contains oil, like that of the Olives.[2] But the seeds of some species certainly contain it; as do also those of the Limes, sometimes roasted, and used as a substitute for cocoa. The seeds of *Corchorus olitorius* are purgative.

As a textile substance the liber of the Limes has been used for centuries in the manufacture of mats, cordage, cables, string, coarse stuffs and even paper. The thread of *Jute* or *Paat*, which is imported so largely by Europe from Asia and tropical Africa, is furnished by the bark of *Corchorus olitorius* and some neighbouring species.[3] The arborescent *Tiliaceæ* have often a useful wood. That of the European and American Limes is employed for many domestic purposes, in building, carving, &c.; charcoal of a good quality is prepared from it. Some species of *Grewia* in the Old World, particularly the *Dhamnoo* of India, or *G. elastica* Royle,[4] some *Elæocarpus*; in Brazil, *Luhea*; in Asia and tropical Australia, *Berrya Amomilla*,[5] has also a useful wood, often solid, enduring, elastic, good for carpenters' and wheelwrights' work, &c. Some species of *Corchorus* are mentioned in the East as tinctorial plants. In Peru, *Vallea cordifolia* R. & Pav.[6] is said to furnish a yellow dye. The nuts of several species of Indian *Elæocarpus*, particularly those of *E. Ganitrus*,[7] are known to collectors by their hardness, and the use that is made of them for the toilette; they are carved more or less finely, set in gold, or incrusted with stones and jewels. Collars and chaplets are made of them which are sometimes of a high price. Several species of *Elæocarpus* have charming flowers,[8] white, red or yellowish, whose laci-

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A. S. H. and *eriocarpa* A. S. H., which grow in Brazil by the wayside and are used in the treatment of gonorrhœa. They bear the common name of *Carapixo de calcada* (Lindl., *Fl. Med.*, 148).

[1] Lhér., *Stirp.*, ii. 31, t. 16.—Mér. & Del., *Dict. Mat. Méd.*, i. 417.—H. Bn., in *Dict. Encycl. Sc. Méd.*, vi. 125. This plant is used in dyeing black.

[2] Roxburgh is said not to have succeeded in extracting it. The fruits bear in India the common names of *Tulpai, Julpai.*

[3] That is to say, *C. capsularis* L. (*Spec.*, 746.—Gærtn., *Fruct.*, t. 129), *acutangulus* Lamk., (*Dict.*, ii. 104), *trilocularis* L., *tridens* L., &c.

[4] From it are made very flexible bows, the shafts of carriages, handles of whips, &c.

[5] Roxb., *Cat. Hort. Calc.*, 42.—DC., *Prodr.*, i. 518. Its light wood, named by the English *Trincomale wood*, is used in Madras in the construction of craft, called *Massoola boats.*

[6] *Fl. Per.*, 132.—DC., *Prodr.*, i. 520, n. 2. It is probably only a variety of *V. stipularis* Mut. (ex L. f., *Suppl.*, 266).

[7] *Ganitrus sphærica* Gærtn., *Fruct.*, ii. 271, t. 139, fig. 6 (?). See Rumph., *Herb. Amboin.*, t. 101.—Burm., *Zeyl.*, 30, t. 40.

[8] See *Bot. Mag.*, t. 4680.

niate petals make such an effect in our greenhouses. Their fruits are also remarkable for an azure tint, or an almost metallic lustre.

In our orangeries and greenhouses, *Sparmannia*, and several species of *Grewia* and *Entelea arborescens*, are cultivated for their white flowers and spinose fruits. The *Luheas* are also cultivated, but rarely bloom. *Aristotelia Maqui* supports in the open air the climate of the south and west of France. The Limes are valued more than any other genus of this family for planting in parks, on promenades and by-roads, for the beauty of their foliage, the grace of their form and the fragrant odour of their flowers.

GENERA.

I. BROWNLOWIEÆ.

1. **Brownlowia** Roxb.—Flowers regular hermaphrodite; calyx subcampanulate, regularly or irregularly 3–5-dentate or 3–5-fid, valvate. Petals 5, narrow at base, unequal at apex; præfloration contorted or imbricated. Stamens ∞, produced with the summit of the receptacle beyond the perianth in a small cylindrical column inserted below the germen, 5 of which are antherless, oppositipetalous elongated-petaloid; others disposed in 5 phalanges, alternate; filaments thin, free or connate at base; anthers 2-locular extrorse; cells subglobose, rimose, finally confluent at apex. Carpels 3–5, alternipetalous, free; germens 1-locular; ovules 2, ascending; micropyle extrorse inferior; style subulate; apex stigmatiferous not thickened. Carpels in fruit 1–5 (usually solitary, others abortive), free subglobose thick, 2-valved. Seed solitary, largely umbilicate; embryo exalbuminous; cotyledons thick fleshy plano-convex, decurrent below round radicle.—Trees; hairs stellate or lepidote; leaves alternate entire petiolate; stipules small, little conspicuous or caducous; limb entire penniverved, base 3–5-nerved; flowers in ramified cymiferous racemes, terminal or in axils of upper leaves (*Trop. Asia*). See p. 167.

2. **Christiana** DC.[1]—Flowers nearly of *Brownlowia;* stamens all fertile. Carpels 5 (or fewer) free at maturity, 2-valved. Seeds solitary pisiform; testa crustaceous; cotyledons of coloured embryo foliaceous; albumen fleshy.—A tree; leaves and inflorescence nearly of *Brownlowia*[2] (*Trop. West Africa*[3]).

[1] *Prodr.*, i. 516.—Endl., *Gen.*, n. 5375.—B. H., *Gen.*, 232, n. 5.—Bocq., in *Adansonia*, vii. 61.

The genus is discussed by R. Br., *Congo*, 428; *Misc. Works* (ed. Benn.), i. 108; the calyx is said to be little known, with gynæceum 5-merous, 3-lobed. It is doubtful whether the 4-lobes, as frequently in *Brownlowia*, are more or less united for some distance in pairs.

[3] Spec. 1. *C. africana* DC., *loc. cit.*—Mast., in *Oliv. Fl. Trop. Afr.*, i. 241.— *C. cordifolia* Hook. f., *Niger*, 238.—Walp., *Ann.*, ii. 171.

3. **Diplodiscus** Turcz.[1]—Flowers nearly of *Brownlowia ;* stamens 5 together, antherless. Carpels 5, connate at base in 5-locular germen ; cells 2-ovulate. Capsule tomentose (5-valved ?)—Trees ; leaves oblong penninerved, base scarcely 3-nerved coriaceous ; flowers in ramified racemose cymes, terminal and lateral (*Philippine Islands*[2]).

4. **Pentace** Hassk.[3]—Flowers of *Brownlowia ;* carpels 3–5, coalescent in flower. Fruit dry, indehiscent, 3–5-winged, wide, vertical, appendiculate. Seed abortive 1, albuminous.—Trees ; leaves 3–5-nerved at base, and inflorescence of *Brownlowia*[4] (*Java, Malaya*[5]).

5. **Pityranthe** Thw.[6]—Flowers of *Brownlowia ;* ovules in each cell 2, descendent. Capsule subturbinate, 5-angular, shortly 5-winged, 5-valved.—A tree ; flowers and inflorescence nearly of *Brownlowia* (*Zeylania*[7]).

6. **Berrya** Roxb.[8]—Flowers nearly of *Christiana ;* stamens all fertile. Germen 5-lobed, 3-locular ;[9] ovules in each cell 4–∞, 2-seriate. Capsule loculicidal, 3, 4-valved ; valves dorsally 2-winged, vertical divergent above, appendiculate. Seeds 1–∞, rigid pilose ; embryo albuminous, cotyledons foliaceous (virescent).—A tree ; leaves 5–7-nerved at base, and inflorescence of *Brownlowia* (*Trop. Asia and Australia*[10]).

7. **Carpodiptera** Griseb.[11]—Flowers polygamo-dicœcious, nearly of *Berrya ;* germen 2-locular ;[12] style afterwards divided into 2-lobes,

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[1] In *Bull. Mosc.* (1858), i. 235.—B. H., *Gen.*, 232, n. 3.

[2] Spec. 1 v. 2. Walp., *Ann.*, vii. 442.

[3] *Hort. Bogor.*, ed. 2, i. 110.—B. H., *Gen.*, 231, n. 2.—Bocq., in *Adansonia*, vii. 60.

[4] To this is to be referred (ex B. H., *Gen.*, 985) *Pterocœlion* Turcz. [in *Bull. Mosc.* (1863), i. 575], a Javanese tree, flowers 4 or 5-merous, "capsule 10-celled, 10-winged," by authors referred to *Dombeyæ*, and seeming to have some affinity with *Berryæ*.

[5] Spec. 2 v. 3.

[6] *Enum. Pl. Zeyl.*, 29.—B. H., *Gen.*, 232, n. 4.—Bocq., in *Adansonia*, vii. 60.

[7] Spec. 1. *P. verrucosa* Thw., *loc. cit.*—Walp., vii. 442.—*Kleinhovia verrucosa* Gardn.

[8] Roxb., *Pl. Coromand.*, iii. 60, t. 264.—DC., *Prodr.*, i. 517.—Endl., *Gen.*, n. 5379.—H. Bn., in *Payer Fam. Nat.*, 276.—B. H., *Gen.*, 232, 985, n. 6.—Bocq., in *Adansonia*, vii. 56.—*Espera* W., in *Ges. Nat. Fr. Berl. N. Schr.*, iii. 449.—DC., *Prodr.*, i. 517.—*Hexagonotheca* Turcz., in *Bull. Mosc.* (1846), ii. 505.

[9] Sometimes, but more rarely, 4-merous.

[10] Spec. 1. *B. Amomilla* Roxb., *loc. cit.*—Wight & Arn., *Prodr.*, i. 81.—Wight, *Ill.*, t. 34.—Benth., *Fl. Austral.*, i. 268.—*Hexagonotheca cordata* Turcz., *loc. cit.*—Walp., *Ann.*, i. 111.

[11] *Pl. Cub.*, in *Mem. Amer. Acad.*, viii. 163.—B. H., *Gen.*, 232, 985, n. 8.—H. Bn., in *Adansonia*, x. 192.

[12] Sometimes 3-4-merous.

wide subsessile subpetaloid lacerate; ovule in each cell solitary descending. Capsule subglobose, with 2-valved dehiscence; each valve (as in *Berrya*) 2-winged. Seeds rigid, hairy albuminous?—Trees; leaves and inflorescence of *Brownlowia* (*Trop. America, continent and insular eastern Africa*[1]).

II. TILIEÆ.

8. **Tilia** T.—Flowers hermaphrodite; receptacle shortly conical. Sepals 5, valvate. Petals 5, alternate, base naked or squamose enlarged, imbricated. Stamens ∞, inserted with perianth, filaments subfree or connate at base in 5 phalanges, oppositipetalous; anthers extrorse; cells distinct, longitudinally rimose, either all fertile or 1 terminal in each interior bundle sterile, petaloid-elongate, oppositipetalous, imbricated. Germen sessile; cells 5, alternipetalous; style erect; apex dilated stigmatiferous, 5-dentate; teeth connivent, divergent or patent; ovules in each cell 2, ascending; micropyle extrorse inferior. Fruit subglose nut-shaped, indehiscent. Seeds 1, or few, ascending; albumen fleshy; embryo usually curved; cotyledons widely foliaceous sublobed corrugate, involute at margin.—Trees; hairs simple or stellate; leaves alternate; often oblique, cordate, serrate at base; stipules 2, lateral; flowers terminal on twigs or axillary, subracemose; terminal 1; others lateral, bracteate; inferior bract foliaceous, wing-shaped, rather large, adnate to peduncle at middle (*All the northern temp. regions of the Globe*). See p. 169.

9. **Schoutena** KORTH.[2]—Sepals 5,[3] connate at base, valvate, reticulate, persistent, accrescent after anthesis. Petals 5, shorter, linear, naked at base or very shortly sublanceolate, caducous. Stamens ∞,[4] inserted in receptacle shortly under germen; filaments filiform

[1] Spec. 4, of which are Amer. 2. GRISEB., *Cat. Pl. Cub.*, 29.—MAST., in *Oliv. Fl. Trop. Afr.*, i. 241.—H. BN., in *Adansonia*, x. 180, 181.—WALP., *Ann.*, vii. 442.

[2] In *Ned. Kruidk. Arch.*, i. 313.—B. H., *Gen.*, 237, n. 26.—*Aetinophora* WALL., *Cat.*, n. 1163.

[3] Stellate pubescent.

[4] Often from 15–20.

short free persistent; anthers ovate-oblong, 2-locular, subintrorsely rimorse.[1] Germen 3–5-locular; cells incomplete; ovules in each cell 2, ascending; micropyle extrorse inferior; style slender, apex thickened stigmatiferous 3–5-sulcate, 3–5-fid. Capsule globose, furnished with stellate-patent calyx, by abortion 1-spermous. Testa of ascending seed thin; embryo albuminous; cotyledons wide, involute at margin.—A tree; hairs stellate; leaves alternate serrate, oblique 3–5-nerved at base; flowers in short axillary cymes (*Ind. Arch.*[2]).

10? **Muntingia** Plum.[3]—Flowers 5- or more rarely 6–7-merous; receptacle convex. Sepals valvate and petals same in number, alternate, naked at base, imbricate. Stamens ∞, inserted round the hypogynous cupuliform sometimes villous or glandular-pilose disk; filaments free; anthers introrse, sooner or later partly reflexed, versatile, 2-rimose. Germen free, 5–7-locular; ovules ∞, inserted on a 2-lobed descending placenta (otherwise free); style short tubular,[4] apex stigmatiferous, 5–7-sulcate-lobed. Berry irregularly ∞-locular. Seeds ∞, small, imbedded in pulp; embryo albuminous straight; cotyledons small; radicle thick.—A small tree; hairs stellate; leaves alternate, unequally dentate at base; flowers[5] pedunculate axillary, solitary or in few-flowered cymes (*Trop. America*[6]). See p. 172.

11. **Glyphæa** Hook. f.[7]—Flowers 4, 5-merous; receptacle shortly conical. Sepals valvate. Petals alternate, at base naked sessile, imbricate or more rarely contorted. Stamens ∞; filaments free erect short; anthers 2-locular introrse; cells linear; rimose; connective shortly produced beyond cells. Germen free; cells 4–10,

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[1] Cells sublateral adnate to lanceolate connective (darkened in drying).

[2] Spec. 1. *S. ovata* Korth., *loc. cit.*—*Actinophora fragrans* Wall., *loc. cit.*—Benn., *Pl. Jav. Rar.*, t. 46. There may be two species of Schoutenia, one of which, from Borneo, is undescribed.

[3] *Gen.*, 6, t. 14.—L., *Gen.*, n. 651.—Gærtn., *Fruct.*, i. 285, t. 59.—DC., *Prodr.*, i. 511.—Spach, *Suit. à Buffon*, iv. 38.—Endl., *Gen.*, n. 5380.—B. H., *Gen.*, 236, 986, n. 23.—Bocq., in *Adansonia*, vii. 40.—*Calabura* Pluk., *Mant.*, t. 152, fig. 4.

[4] Longitudinally traversed within by thick apices of dissepiments.

[5] White.

[6] Spec. 1. *M. Calabura* L., *Spec.*, 728.—Jacq., *Amer.*, i. t. 107.—H. B. K., *Nov. Gen. et Spec.*, v. 318.—Karst., *Fl. Columb.*, ii. 55, t. 128.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 355.—Walp., *Rep.*, i. 363; *Ann.*, vii. 448.

[7] *Niger.*, 237, t. 22.—B. H., *Gen.*, 237, n. 27.—Bocq., in *Adansonia*, vii. 43.

∞-ovulate in internal angle; style short hollow, apex stigmatiferous pulpous, subentire or unequally crenate. Fruit oblong-fusiform dry inermis, 4–10-lobular, 4–10-sulcate; cells with difficulty septicidal ∞-spermous, and transversely septate between seeds. Seeds finally sub-1-seriate, unequally-compressed; testa crustaceous; albumen fleshy; embryo axile; cotyledons orbicular-cordate.—Shrubs; leaves of *Grewia*, denticulate 3-plinerved, stipules minute subulate very caducous; flowers[1] in pedunculate, subaxillary lateral or terminal cymes (*Trop. Africa*[2]). See p. 172.

12. **Apeiba** Aubl.[3]—Flowers 5- or more rarely 4-merous; receptacle conical. Sepals valvate and petals same in number, alternate, imbricate or subvalvate. Stamens ∞, free, ∞-seriate; exterior often sterile, dilated in petaloid lamina; interior fertile; anthers introrse; cells linear, longitudinally rimose; connective sometimes produced beyond cells. Germen ∞-locular; cells[4] ∞-ovulate; style tubular or long obconical, interior hollow, apex stigmatiferous ∞-denticulate, or more rarely straight cut. Fruit depressed-globose, coriaceous or subligneous, tuberculate or echinate, indehiscent or dehiscing with difficulty. Seeds ∞, nidulant in pulp, suborbiculate or compressed; albumen fleshy; embryo straight; cotyledons orbiculate-subcordate.—Trees or small trees; leaves alternate, large, 3–5-nerved; flowers[5] in cymes 2- or 3-chotomous; peduncle terminal, lateral or subleaf-opposed; bracts often stipuliform deciduous (*Trop. America*[6]). See p. 172.

13. **Ancistrocarpus** Oliv.[7]—"Sepals 4, free. Petals 4, naked at base. Stamens ∞, inserted on non-elevated torus, coalescing in 4 phalanges, opposite sepals; phalanges connected at base by a membrane; anthers linear muticous. Germen sub-6-locular; dissepi-

[1] Yellow; bud nearly of *Grewia*.

[2] Spec. 2. Don, *Gen. Syst.*, i. 549 (*Grewia*).—Hook. f., in *Bot. Mag.*, t. 5610.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 267.—H. Bn., in *Adansonia*, x. 175.—Walp., *Ann.*, i. 111; ii. 172; vii. 450.

[3] *Guian.*, 537, t. 213–216.—J. *Gen.*, 291.—Gærtn., *Fruct.*, ii. 188, t. 121.—Lamk., *Dict.*, Suppl., i. 406; *Ill.*, t. 470.—DC., *Prodr.*, i. 514.—Endl., *Gen.*, n. 5361.—H. Bn., in *Payer Fam. Nat.*, 276.—B. H., *Gen.*, 237, n. 28.—Bocq., in *Adansonia*, vii. 39. — *Aubletia* Schreb., *Gen.*, 353. — *Oxytandrum* Neck., *Elem.*, n. 1005. — *Sloanea* Lœfl., *It.*, 311 (nec. L.).

[4] Sometimes 30–40.

[5] "Flavescentibus v. virescentibus."

[6] Spec. ad 5. Sw., *Fl. Ind. Occ.*, t. 16, f. 1 (*Aubletia*).—H. B. K., *Nov. Gen. et Spec.*, v. 347.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 60.—Griseb., *Fl. Brit. W.-Ind.*, 98.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 346.—Walp., *Rep.*, ii. 798; v. 116; vii. 450.

[7] In *Journ. Linn. Soc.* ix. 173.—B. H., *Gen.*, 986, n. 28 *a*.

ments scarcely coalescing at centre; cells ∞-ovulate; style simple; stigma obtuse. Fruit globose coriaceous uncinate-echinate (loculicidal 3-valved?). Seeds ∞, nidulant in pulp; embryo...?—Small trees or shrubs; leaves alternate glabrous, or glabrescent rigidly membranous denticulate, sub-3-plinerved at base; flowers[1] in umbelliferous pedunculate few-flowered lateral or terminal cymes; fructiferous peduncles recurved" (*Trop. West Africa*[2]). See p. 172.

14. **Luhea** W.[3]—Flowers calyculate; sepals 5, thick valvate. Petals 5, base naked or glandular-thickened, sometimes connate with base of androceum, imbricated or contorted. Stamens ∞, free or shortly connate at base in 5 phalanges, alternipetalous, or in 10; exterior ones antherless, generally filiform; interior fertile; anthers extrorse, sometimes subsagittate, longitudinally rimose. Germen free; cells 5, ∞-ovulate, sometimes falsely septate within; ovules 2-seriate, ascending, imbricate; style erect, obscurely 5-lobed at apex. Capsule ligneous, loculicidal semi-5-valved. Seeds ∞, imbricate, ascending, upper part produced in a wing; embryo albuminous; cotyledons planofoliaceous.—Trees or shrubs; hairs simple and stellate; leaves alternate, sometimes oblique at base, serrate, reticulate; stipules 2-nate, deciduous; flowers[4] solitary, or oftener in ramified cymiferous racemes; bracts under flower 5–8, often longer than calyx, sometimes connate, deciduous, simulating an exterior calyx (*Hot regions of N. and S. America*).[5] See p. 172.

15 ? **Græffea** Seem.[6]—"Flowers hermaphrodite; sepals 5, valvate. Petals 5, naked at base, imbricate. Stamens ∞, inserted on the receptacle produced in a cone beyond perianth, ∞-seriate; filaments free; anthers oblong, 2-locular versatile rimose. Germen 2-locular; style short, stigmatiferous at apex, dilated hollow, unequally denticulate; cells ∞-ovulate. Fruit...?—A glabrous tree; leaves alternate,

[1] "Mediocritibus, albis."

[2] Spec. 2. Mast., in *Oliv. Fl. Trop. Afr.*, i. 265.

[3] In *Ges. Nat. Fr. Berl. N. Schr.*, iii. 409, t. 5.—DC., *Prodr.*, i. 517.—Endl., *Gen.*, n. 5365.—Spach, *Suit. à Buffon*, iv. 39.—B. H., *Gen.*, 235, n. 20.—Bocq., in *Adansonia*, vii. 45.—*Brotera* Velloz., *Fl. Flum.*, vii. t. 163.—*Alegria* Moç. & Sess., *Fl. Mex. Med.* (ex DC., *Prodr.*, i. 516).

[4] White or pink, beautiful.

[5] Spec. ad 15. Mart. & Zucc., *Nov. Gen. et Spec.*, i. 98, t. 61–63.—A. S. H., *Pl. Us. Bras.*, t. 66; *Fl. Bras. Mer.*, i. 289, t. 57, 58.—Pohl., *Pl. Bras.*, t. 186, 187.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 58.—Te. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 347.—Walp., *Rep.*, i. 352; ii. 798; v. 116; *Ann.*, vii. 448.

[6] *Journ. of Bot.* (1864), 71, t. 6; *Fl. Vit.*, 27, t. 6.—Bocq., in *Adansonia*, vii. 52.—B. H., *Gen.*, 986, n. 22 *a*.

petiolate ovate-oblong serrate acuminate, base cordate 3–5-nerved; stipules large obovate connate in a persistent ocreiform cupule; flowers in pedunculate axillary cymes; peduncles 2-chotomous; pedicels 2-bracteolate at base; bractlets 3, formed into an involucel under flower" (*Fiji Islands*[1]). See p. 172.

16. **Mollia** MART. & ZUCC.[2]—Flowers 5-merous; sepals valvate. Petals alternate, naked at base, subentire, valvate, or more or less 3-fid and subimbricate at apex; ribs sometimes rather prominent within. Stamens ∞, inserted with petals, 10-adelphous; phalanges 5 oppositipetalous and 5 alternate, large; filaments finally free;[3] anthers narrow, subsagittate; cells linear-introrse or sublateral, longitudinally rimose, connective sometimes apiculate. Germen superior; cells 2, complete or incomplete, ∞-ovulate; style slender; apex stigmatiferous, obtuse. Capsule 2-locular, elongate, expanded at apex into short curved marginal wing, compressed contrarily to narrow septum, loculicidal, semi-2-valved, falsely septate between seeds. Seeds transverse compressed; albumen ?; embryo straight; cotyledons flat, membranous.—Trees; leaves alternate, entire or serrate; stipules laterally 2-nate; flowers[4] axillary, solitary, or in cymes, sometimes 1-parous (*Tropical America*[5]). See p. 172.

17. **Sparmannia** L. F.[6]—Sepals 4, of which 2 are lateral, sometimes petaloid, valvate. Petals 4, alternate, naked at base, imbricate. Stamens ∞, inserted with perianth; filaments at base connate in 4 alternipetalous phalanges, otherwise free; exterior, antherless, glandular-undulate or moniliform above, interior longer, torulose, fertile; anthers introrse, finally versatile, 2-rimose. Germen superior; cells 4 or more rarely 5–8, complete or incomplete, ∞-ovu-

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[1] Spec. 1. *G. calyculata* SEEM., *loc. cit.*

[2] *Nov. Gen. et Spec.*, i. 96, t. 60.—SPACH, *Suit. à Buffon*, iv. 42.—ENDL., *Gen.* n. 5366. — BENTH., in *Journ. Linn. Soc.*, v. Suppl., 59.—B. H., *Gen.*, 236, n. 21.—H. BN., in *Payer Fam. Nat.*, 276.—BOCQ., in *Adansonia*, vii. 58.—*Schlechtendalia* SPRENG., *Syst. Cur. Post.*, 295 (nec W., nec LESS.).

[3] A few sterile ones sometimes intermixed.

[4] White, beautiful.

[5] Spec. ad 6. WALP., *Rep.*, i. 353; v. 117.

[6] *Suppl.*, 41.—J., *Gen.*, 290.—LAMK., *Dict.*, vii. 308; *Ill.*, t. 468.—RETZ., *Obs.*, v. t. 3.—DC., *Prodr.*, i. 503.—SPACH, *Suit. à Buffon*, iv. 5.—ENDL., *Gen.*, n. 5369.—PAYER, *Organog.*, 22, t. 5.—H. BN., in *Payer Fam. Nat.*, 275.—B. H., *Gen.*, 235, n. 16.—BOCQ., in *Adansonia*, vii. 38.

late;[1] style simple; apex stigmatiferous, rimose, ramified-papillose. Capsule subglobose, rigid echinate, loculicidal; cells 1–∞-spermous. Seeds unequally obovoid; testa crustaceous, sometimes rugose; embryo albuminous, nearly straight, curved or folded; cotyledons suborbiculate, subplane.—Trees or shrubs; hairs stellate, soft; leaves petiolate, alternate, cordate, dentate, or lobed; stipules lateral; flowers[2] in many 1-parous cymes, inserted at the top of peduncle (terminal or axillary to upper leaves) subumbellate (*Tropical and Southern Africa*[3]). See p. 172.

18. **Entelea** R. Br.[4]—Flowers nearly of *Sparmannia*, 4- or more rarely 5-merous; sepals valvate; apex acuminate. Stamens ∞, all fertile, free; anthers versatile. Germen 4–8-locular; cells ∞-ovulate; style stigmatiferous, dilated, denticulate at apex. Capsule globose, rigid echinate, above loculicidalhians 4–8-valved; septa solute at apex. Seeds ∞, obovoid; testa glabrous, coriaceous; embryo albuminous, almost straight or curved; cotyledons cordate-orbiculate.—A tree; hairs stellate; leaves alternate, dentate, sub-3-lobed, base 5–7-nerved; stipules lateral; flowers[5] in cymiferous racemes subumbellate, terminal and axillary to upper leaves, bracteate (*New Zealand*[6]). See p. 172.

19. **Honckenya** W.[7]—Flowers 4, 5-merous; receptacle scarcely elongated beyond perianth. Sepals valvate, externally below the apex produced in a point sometimes glandular. Petals same in number, naked at base, imbricate. Stamens ∞, inserted round a disk scarcely visible and scarcely higher than the perianth, free; exterior ∞ antherless, filiform; interior few (7–10) fertile; anthers introrse, 2-locular; cells linear, separate on both sides, longitudinally rimose. Germen 4–8-locular; cells ∞-ovulate; style simple,

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[1] Coat of ovules double.

[2] White, sometimes beautiful, resembling those of *Dombeyeæ*, stamens 2-coloured, pale yellow and dusky purple.

[3] Spec. 3. Vent., *Malmais.*, t. 78.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 260.—Harv. & Sond., *Fl. Cap.*, i. 223.—*Bot. Mag.*, t. 516.—Walp., *Ann.*, i. 110; ii. 169; vii. 447.

[4] In *Bot. Mag.*, t. 2480.—Spach, *Suit à Buffon*, iv. 4.—Endl., *Gen.*, n. 5368.—B. H., *Gen.*, 234, n. 15.—H. Bn., in *Payer Fam. Nat.*, 275.—Bocq., in *Adansonia*, vii. 37.

[5] White, ordinary.

[6] Spec. 1. *E. arborescens* R. Br., *loc. cit.*—A. Gray, in *Amer. Expl. Exped., Bot.*, 195.—Walp., *Rep.*, v. 117.—*Apeiba australis* A. Rich., *Fl. N.-Zel.*, t. 34.

[7] In *Ulster. Del.*, ii. 200, t. 4; *Spec. Pl.*, ii. 325.—DC., *Prodr.*, i. 506.—Endl., *Gen.*, n. 5370.—B. H., *Gen.*, 235, n. 17.—H. Bn., in *Payer Fam. Nat.*, 275.—Bocq., in *Adansonia*, vii. 38.—*Clappertonia* Meissn., *Gen.*, 35; *Comm.*, 28.—Endl., *Gen.*, n. 5370.

tubular at apex, hians stigmatiferous, 4–8-denticulate. Capsule oblong, echinate, loculicidal; valves 4–8, transversely falsely septate between seeds. Seeds obovate compressed; albumen fleshy; embryo rather thick; cotyledons flat.—Trees or small shrubs; hairs stellate; leaves alternate, dentate, or unequally 3–5-lobed; stipules small, lanceolate or setaceous; flowers[1] in terminal cymes, 1-parous, simple, or little ramified, few; bracts 1-lateral, sometimes incised[2] (*Tropical Western Africa*[3]). See p. 172.

20. **Corchorus** L.[4]—Flowers 4, 5-merous; receptacle often short or elongated between the insertion of stamens and perianth, or more rarely (*Guazumoides*[5]) produced beyond perianth in a slender column dilated at apex, disciform, bearing the sexual organs.[6] Sepals valvate and petals alternate, naked at base, imbricate or more rarely contorted. Stamens either 2 or 3 times as many as petals;[7] all fertile, or the interior 4, 5, oppositipetalous, antherless, petaloid (*Corchoropsis*[8]), or ∞, all fertile; filaments free; anthers introrse or versatile, and finally extrorse (*Corchoropsis*) 2-locular, longitudinally rimose. Germen 2–5-locular; cells complete or very incomplete, 1-locular; placentas sometimes not quite touching the middle of cell,[9] ∞-ovulate; style simple; apex dilated hollow, truncate, denticulate or crenulate stigmatiferous. Capsule short, subglobose (*Ganja*[10]) or much oftener elongate-siliquiform, naked, not horned at apex, 2-valved (*Coreta*[11]), or loculicidal and septicidal 3–10-valved (*Coretoides*[12]), afterwards at apex divergent in 2–5 horns (*Ceratocoreta*[13]), sometimes ovate-oblong, subcylindrical, velvety or muricate

[1] Sometimes large, bluish violet.

[2] Gen. scarcely distinct from *Corchorus*.

[3] Spec. 2 (v. 3 ?). Dcne., in *Deless Ic. Sel.*, v. t. 1.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 260.—H. Bn., in *Adansonia*, x. 183.—Walp., *Ann.*, i. 110.

[4] *Gen.*, n. 675 (nec T.).—J., *Gen.*, 290.—Gærtn., *Fruct.*, i. 307; ii. 482.—Lamk., *Dict.*, ii. 103; Suppl., iii. 349; *Ill.*, t. 478.—DC., *Prodr.*, i. 504.—Spach, *Suit. à Buffon*, iv. 7.—Endl., *Gen.*, n. 5371.—B. H., *Gen.*, 235, 986, n. 18.—Payer, *Organog.*, 23.—A. Gray, *Gen. Ill.*, t. 137.—Bocq., in *Adansonia*, vii. 42.—H. Bn., in *Adansonia*, x. 192.—*Mœrlensia* Velloz., *Fl. Flum.*, v. t. 112.—*Coreta* P. Br., *Jam.*, 147. (incl.: *Antichorus* L., *Corchoropsis* Sieb. & Zucc., *Nettoa* H. Bn.).

[5] DC., *Prodr.*, i. 505 (sect. v.).

[6] Whence the section presents a transition to *Triumfetta*.

[7] Often 8, in 4-merous flowers of *Antichorus* (L., *Mantiss.*, n. 1257). Stirps and aspect distinct.

[8] Sieb. & Zucc., in *Abh. Akad. Münch.*, iii. 737, t. 4.—B. H., *Gen.*, 235, 986, n. 18.—Bocq., in *Adansonia*, vii. 36.

[9] South American and Australian species.

[10] Whence *Nettoa* (H. Bn., in *Adansonia*, vi. 238, t. 7;—B. H., *Gen.*, 986, n. 16 *a*) better made a section of *Corchorusis*; receptacle as in *Guazumoides*, elevated beyond perianth and dilated at apex. The plant affords also an easy transition to the *Triumfettas*. Petals inserted with stamens.

[11] Rumph., *Herb. Amboin.*, v. t. 78, fig. 1.—DC., *loc. cit.* (sect. iv.).

[12] P. Br. *Jam.* (ex DC.).

[13] DC., *Prodr.*, 504 (sect. ii.).

with soft, setose-echinate aculei (*Guazumoides*[1]), rarely septate between seeds. Seeds ∞, horizontal or descending; embryo albuminous, often incurved; cotyledons foliaceous.—Herbs, undershrubs, or small shrubs; hairs simple or sometimes stellate; leaves alternate, serrate; stipules small; flowers[2] solitary or in scanty cymes, terminal, lateral, subleaf-opposed or subaxillary, bracteate[3] (*All warm regions of the globe*[4]). See p. 173.

21. **Grewia** L.[5]—Flowers usually 5- rarely 4-merous; sepals 5, often coloured, valvate. Petals same in number, inserted with the sepals and alternate to them, rarely very small or 0, sessile, and base inwardly foveolate or glandiferous, valvate or imbricate. Receptacle produced in column more or less elongated beyond the insertion of perianth, impressed to foveolate or glandular base of petals, beyond glandular-dilated into disk bearing sexual-organs. Stamens ∞, hypogynous, inserted with pistil; filaments free or connate at base; anthers introrse, 2-locular, finally reflexed or versatile, longitudinally 2-rimose. Germen 4, 5-locular; cells oppositipetalous or more rarely 2, 3-locular; style erect stigmatiferous at apex, more or less dilated, subentire or minute 2–5-lobed. Ovules in each cell 2, ascending, or ∞, 2-seriate, inserted in internal angle; micropyle extrorse . . . erior. Fruit drupaceous, either entire 2, 3-locular (*Microcos*[6]) or within 2, 3-pyrenous (*Vincentia*[7]), usually

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[1] DC., *loc. cit.*, 505 (sect. iii.).

[2] Yellow, usually small, sometimes rather large; cymes sometimes 1-parous.

[3] Sect. (according to several authors) 4 certain: 1. *Antichorus* (L.f.);—2. *Coreta* P. Br. (incl., ex Endl.: α *Eucoreta* (Endl.), β *Coretoides* (DC.), γ *Ceratocoreta* (DC.);—3. *Ganja* (DC.); — 4. *Guazumoides* (DC.); add.: 5. *Nettoa* (H. Bn.);—6. *Corchoropsis* (Sieb. & Zucc.).

[4] Spec. about 30, of which 8–10 are Oceanian. H. B. K., *Nov. Gen. et Spec.*, v. 335.—A. S. H., *Fl. Bras. Mer.*, i. 279.—Wight & Arn., *Prodr.*, i. 72.—Wight, *Icon.*, t. 311, 739, 1073.—Harv. & Sond., *Fl. Cap.*, i. 228.—Benth., *Fl. Austral.* i. 275.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 350.—Griseb., *Fl. Brit. W.-Ind.*, 97.—A. Gray, *Amer. Expl. Exped., Bot.*, i. 195.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 261.—Walp., *Rep.*, i. 354; ii. 798; v. 117, 118 (*Corchoropsis*); *Ann.*, ii. 169; iv. 330; vii. 447.

[5] *Gen.*, n. 1026 (part.).—Adans., *Fam. des Pl.*, ii. 382.—J., in *Ann. Mus.*, iv. 82, t. 47-51; *Gen.*, 292, 453.—Gærtn., *Fruct.*, i. 273, t. 57. Lamk., *Dict.*, iii. 42; Suppl., ii. 845; *Ill.*, t. 467.—DC., *Prodr.*, i. 75.—Spach, *Suit. à Buffon*, iv. 9.—Endl., *Gen.*, n. 5376.—B. H., *Gen.*, 233, 985, n. 8.—H. Bn., in *Payer Fam. Nat.*, 276.—Garcke, in *Bot. Zeit.* (1864), 345. —Bocq., in *Adansonia*, vii. 46 (incl.: *Arsis* Lour., *Chadara* Forsk., *Mallococca* Forst., *Microcos* L., *Omphacarpus* Korth., *Siphomeria* Boj., *Vincentia* Boj.).

[6] L., *Gen.*, n. 662.—*Arsis* Lour., *Fl. Cochinch.*, 335 (Spec. 2, 3, Asiat. & Afr. Trop. Wight, *Ill.*, t. 33; *Icon.*, t. 84.—Hook., in *Bot. Misc.*, i. t. 60).

[7] Boj., in *Hook. Bot. Misc.*, i. 293, t. 62.—*Vinticena* Steud., *Nomencl.*, ed. 2 (Spec. Afr. Trop. Or. Cont. & Ins., & Austral. Gærtn., *loc. cit.*, t. 106, fig. 3.—Harv. & Sond., *Fl. Cap.*, i. 225, n. 2).

more or less deeply 2–5-lobed; lobes each constituting a subdistinct drupe (*Eugrewia*[1]); mesocarp sometimes fibrous-subexsuccous (*Omphacarpus*[2]). Seeds ascending or subhorizontal; albumen fleshy, copious, scanty or 0; embryo straight; radicle conical; cotyledons flat, foliaceous or fleshy plano-convex, often cordate, 3-nerved at base.—Trees or shrubs; hairs usually stellate; leaves alternate, entire or serrate, often obliquely 3–7-nerved at base; stipules rather large, small or 0; flowers[3] axillary or terminal, solitary or cymose, more rarely cymose-racemose; bracts usually small, often caducous (*All warm regions of the globe*[4]). See p. 175.

22. **Desplatsia** Bocq.[5]—Flowers nearly of *Grewia;* sepals[6] and petals 4, 5. Stamens ∞, inserted as in *Grewia;* filaments 1-adelphous at base. Germen 4, 5-locular; cells ∞-ovulate; style in column; apex stigmatiferous, minute, dilated, 4, 5-lobulate. Fruit large,[7] oblong or ovoid, externally coriaceous, internally fibrous-suberous, indehiscent. Seeds ∞, immersed in fibrous pericarp, oblong, surrounded by a narrow membranous wing.[8]—A subglabrous shrub;[9] habit and leaves of *Grewia*, oblong, 3-nerved at base, sometimes slightly oblique, acuminate, serrate; stipules linear-pluripartite; flowers[10] in axillary and terminal cymes (*Tropical Western Africa*[11]). See p. 175.

23. **Duboscia** Bocq.[12]—Flowers nearly of *Grewia*, 4, 5-merous; petals short, glandular-thickened at base, acute at apex. Stamens inserted as in *Grewia;* anthers sub-2-dymous. Germen 4–8-locular;

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[1] "*Grewia* veræ." B. H., *loc. cit.*, i.

[2] Korth., *Verh. Nat. Gesch. Bot.*, 192, t. 42 (Spec. 2, 3. Afr. Trop. & Arch. Ind.).

[3] Rather large or moderate, purple, yellow, white, or greenish.

[4] Spec. ad 60. P. Beauv., *Fl. Ow. et Ben.*, i. t. 30; ii. 102, 108.—Wight & Arn., *Prodr.*, i. 75.—Wight, *Icon.*, t. 44, 45, 76, 82 83, 89.—Guill. & Perr., *Fl. Sen. Tent.*, i. t. 20.—Harv. & Sond., *Fl. Cap.*, i. 224.—A. Gray, *Amer. Expl. Exped., Bot.*, i. 197.—Seem., *Fl. Vit.*, 26.—Benth., *Fl. Austral.*, i. 269.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 204.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 242.—Walp., *Rep.*, i. 360; ii. 799; v. 119; *Ann.*, ii. 171; iv. 330; vii. 442.

[5] In *Adansonia*, vii. 51.—B. H., *Gen.*, 985, n. 8 *a*.

[6] Outwardly slightly stellate-pubescent, inwardly induplicate-fimbriate at base.

[7] "3, 4 inches long, 2, 3 inches wide."

[8] "Moist gelatinous."

[9] Except inflorescence and petioles.

[10] Red.

[11] Spec. 1. *D. subericarpa* Bocq., *loc. cit.*—Mast., in *Oliv. Fl. Trop. Afr.*, i. 266.

[12] In *Adansonia*, vii. 50.—B. H., *Gen.*, 985, n. 8 *b*.

style stigmatiferous, fimbriate at apex. Fruit large,[1] globose, oblong-obtuse, longitudinally traversed by 8 rather prominent obtuse angles, inwardly fibrous-suberous indehiscent; seeds ∞, immersed; embryo albuminous.—A tree; leaves alternate, ovate-oblong, acuminate, slightly stellate-pubescent beneath, oblique cordate at base; stipules minute or very caducous; flowers in pedunculate leaf-opposed cymes, usually 3-nate; bracts 3, wide cordate before anthesis valvate, alternating with flowers, more rarely 4, involucrate (*Tropical Western Africa*[2]). See p. 175.

24. **Columbia** Pers.[3]—Flowers nearly of *Grewia*;[4] germen 3–5-locular; style slender; apex stigmatiferous, subentire or shortly 5-dentate. Ovules in each cell (more or less complete) 2–∞, 2-seriate, descending. Fruit dry, glabrous, or tomentose, vertically 3–5-winged, or septicidal 3–5-coccous; cocci semi-winged at margin (from the wings being cut into 2 plates), or indehiscent, sometimes falsely septate between seeds (*Diplophractum*[5]). Seeds in coccous 1–∞, descending or ascending, albuminous.—Trees; leaves alternate, more or less oblique at base, 3-nerved, serrate or crenate; stipules small or foliaceous, dissimilar, the second 2-lobed setigerous (*Diplophractum*); flowers in cymiferous racemes, axillary or terminal, sometimes much ramified (*Tropical Asia*[6]). See p. 175.

25. **Trichospermum** Bl.[7]—Flowers nearly of *Grewia;* germen 2-locular; cells complete or incomplete, ∞-ovulate; style at apex stigmatiferous, obconical or sub-fan-shaped, dilated, sub-2-lobed, much papillose. Capsule 2-locular, transverse, elliptical or sub-rhomboidal, compressed contrarily to dissepiments, attenuate at margin or sometimes expanded in a short thick coriaceous wing,

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[1] "Extus villosus, 2, 3 poll. longus, 1, 2 poll. latus."

[2] Spec. 1. *D. Macrocarpa* Bocq., *loc. cit.*—Mast., in *Oliv. Fl. Trop. Afr.*, i. 266.

[3] *Enchirid.*, ii. (1807), 66.—DC., *Prodr.*, i. 512.—Endl., *Gen.*, n. 5378.—B. H., *Gen.*, 233, n. 9.—Bocq., in *Adansonia*, vii. 47.—*Colona* Cav., *Icon.*, iv. 47, t. 370.

[4] Sepals generally stellate-pubescent.

[5] Desf., in *Mém. Mus.*, v. (1819), 34, t. 1.—DC., *Prodr.*, i. 514.—Spach, *Suit. à Buffon*, iv. 36.—Endl., *Gen.*, n. 5377.—B. H., *Gen.*, 233, n. 10.—Bocq., in *Adansonia*, vii. 47.—H. Bn., in *Adansonia*, x. 195.

[6] Spec. 6, 7. Turcz., in *Bull. Mosc.* (1858), i. 233; (1863), i. 575.—Garcke, in *Bonplandia*, v. 258.—Walp., *Rep.*, i. 362; *Ann.*, vii. 444.

[7] *Bijdr.*, 56.—Endl., *Gen.*, n. 5063.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 265.—B. H. *Gen.*, 236, n. 22.—Bocq., in *Adansonia*, vii. 58.—H. Bn., in *Adansonia*, x. 195.—*Diclidocarpus* A. Gray, in *Amer. Expl. Exped., Bot.*, i. 200, t. 14.

finally loculicidal, 2-valved. Seeds ∞, inserted in internal angle of cells, setose, pilose or hairy at margin; embryo albuminous; cotyledons flat.—Trees; leaves entire or serrulate alternate, 3–5-nerved at base; stipules linear, caducous; flowers in racemes terminal or axillary to upper leaves cymiferous; cymes sometimes 1-parous at apex; bracts caducous[1] (*Java, Fiji Islands, Mexico, and Antilles*[2]). See p. 175.

26. **Erinocarpus** Nimm.[3]—Flowers nearly of *Grewia*;[4] germen 3-locular. Ovules in each cell 2, descending; micropyle extrorse superior; cells dorsally somewhat produced in false dissepiments between ovules; style filiform; apex stigmatiferous. Fruit subligneous, indehiscent (?), 3-quetrous; faces cordate-ovate, muricate-echinate; angles subwinged; cells 6, 1-spermous, or sterile 1–5. Seeds descending; testa coriaceous; albumen fleshy; embryo thick; radicle superior; cotyledons flat, subovate, 3–5-nerved at base.—A tree; leaves alternate, palminerved, lobate-dentate; flowers[5] in simple or terminal ramified cymiferous racemes; cymes 1-parous; bracts subcordate entire or unequal-fid (*Peninsular India*[6]). See p. 175.

27. **Triumfetta** Plum.[7]—Flowers nearly of *Honckenya*, sometimes polygamous; receptacle elongated between corolla and stamens, apex dilated into orbicular disk more or less conspicuously glandular-4, 5-lobed. Sepals 4, 5, often mucronate or fornicate outwardly below apex, valvate. Petals 5, imbricated, base inwardly glandular-thickened or foveolate, sometimes dwarf (*Heliocarpus*[8]), or

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[1] We find no generic difference between *Trichospermum* and *Belotian* (A. Rich., *Fl. Cub.*, i. 207, t. 21;—B. H., *Gen.*, 233, n. 11; Bocq., in *Adansonia*, vii. 47;—*Adenodiscus* Turcz. in *Bull. Mosc.* (1846), ii. 504, which, in our opinion, should be regarded an American section of *Trichospermum*; cymes often 1-paris.

[2] Species hitherto described 4, of which 2 are of the Old World. DC., *Prodr.*, i. 510, n. 18 (*Grewia*).—H. Bn., in *Adansonia*, x. 182 (*Belotia*).—Walp., *Rep.*, ii. 800; *Ann.*, i. 111 (*Diplodiscus*); iv. 329 (*Diclidocarpus*); vii. 448.

[3] In *Hort. Bomb. Cat.*, *mss.*—Hassk., in *Retzia*, i. 137.—B. H., *Gen.*, 234, n. 12.—Bocq., in *Adansonia*, vii. 45.

[4] Sepal inwardly subcristate at middle; crest vertical, dilated pilose at base.

[5] Large, yellow.

[6] Spec. 1. *E. Nimmoanus* Dalz., *loc. cit.*—Benth., in *Journ. Linn. Soc.*, v. Suppl.

[7] *Gen.*, t. 8.—L., *Gen.*, n. 600.—Adans., *Fam. des Pl.*, ii. 382.—J., *Gen.*, 290.—Gærtn., *Fruct.*, ii. 137, t. 111.—Poir., *Dict.*, iii. 419; Suppl. iii. 299.—Lamk., *Ill.*, t. 400.—DC., *Prodr.*, i. 506.—Endl., *Gen.*, n. 5372.—H. Bn., in *Payer Fam. Nat.*, 277.—B. H., *Gen.*, 234, 986, n. 13.—Bocq., in *Adansonia*, vii. 43.

[8] L., *Hort. Cliff.*, 211, t. 16; *Gen.*, n. 606.—J., *Gen.*, 290.—Trew., *Pict.*, t. 45.—Lamk., *Dict.*, iii. 89; *Ill.*, t. 409.—DC., *Prodr.*, i. 503.—Spach, *Suit à Buffon*, iv. 6.—Endl., *Gen.*, n. 5367.—B. H., *Gen.*, 234, n. 14.—Bocq., in *Adansonia*, vii. 44.—*Montia* Houst., (ex Endl., nec Michel.).

more rarely 0. Stamens either twice as many as sepals, or oftener ∞, inserted at summit of dilated receptacle below germen, free. Germen 2–5-locular; cells more or less complete; style slender, apex stigmatiferous 2–5-fid or dentate. Ovules in each cell 2, descending; micropyle extrorse superior. Capsule 2–5-merous, externally echinate, setose or plumose-ciliate, sometimes stipitate subclavate (*Heliocarpus*), indehiscent (*Eutriumfetta*[1]), sometimes subindehiscent or loculicidal 2-valved (*Heliocarpus*), or separating into cocci at maturity (*Bartramia*[2]). Seeds in each cell 1, or 2, sometimes separated by false septa, descending; embryo albuminous straight; cotyledons plano-foliaceous.—Trees, shrubs or herbs; hairs stellate; leaves entire serrate, or 3–5-lobed; flowers[3] in cymes, sometimes simple, oftener in simple or ramified terminal aggregate racemes (*All hot regions*[4]). See p. 175.

28. **Vasivæa** H. Bn.[5]—Flowers diœcious, usually 4-merous. Sepals valvate, finally free. Petals 4, alternate, dilated at base in a subplane, subglandular pit pilose at margin, imbricated. Male flower ∞-androus. Stamens inserted on receptacle, slightly elevated beyond perianth; filaments free; anthers extrorse; connective suborbiculate (coloured); cells submarginal, longitudinally rimose, not confluent. Stamens in female flower ∞, sterile, or bearing anthers 2-locular, more or less perfectly fertile, hypogynous. Germen (in male flower 0) subsessile subglobose (densely setose), 4-locular; style short, afterwards in 4 lobes, unequally lobed, sometimes subpetaloid, lobed; ovules solitary in each cell, descending; micropyle extorse superior. Fruit?—A tree? leaves alternate petiolate ovate-acute, crenate, cordate 3-nerved at base; stipules small subulate

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[1] *Triumfetta* Gærtn., *loc. cit.*—*Lappula* DC., *loc. cit.* (sect. i.).

[2] Gærtn., *loc. cit.*—Lamk., *Ill.*, t. 400.—*Bartramea* DC., *loc. cit.* (sect. ii.).—? *Porpa* Bl., *Bijdr.*, 117 (ex Endl.).

[3] Yellow, or subgolden, in species of Tropical America often large.

[4] Spec. ad 40. H. B. K., *Nov. Gen. et Spec.*, v. 341, t. 488.—A. S. H., *Fl. Bras. Mer.*, i. 283.—Wight & Arn., *Prodr.*, i. 73.—Wight, *Icon.*, t. 320.—Guill. & Perr., *Fl. Sen. Tent.*, i. t. 18, 19.—A. Rich., *Fl. Cub.*, t. 22.—Harv. & Sond., *Fl. Cap.*, i. 227.—Harv., *Thes. Cap.*, t. 52.—Griseb., *Fl. Brit. W.-Ind.*, 95.—A. Gray, *Amer. Expl. Exped., Bot.*, i. 196.—Turcz., in *Bull. Mosc.* (1858), i. 227; (1859), i. 260.—Seem., *Fl. Vit.*, 26.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 351.—Benth., *Fl. Austral.*, i. 272.—Mast., in *Oliv. Fl. Trop. Afr.*, i. 254.—H. Bn., in *Adansonia*, x. 175.—Walp., *Rep.*, i. 355; ii. 799; v. 118; *Ann.*, i. 110; ii. 799; v. 118; *Ann.*, i. 110; ii. 169; iv. 330; vii. 444, 446 (*Heliocarpus*).

[5] In *Adansonia*, x. 191.

caducous; male flowers in terminal cymiferous racemes, bracteate or minute-leaved; female flowers few or solitary[1] (*Trop. America*[2]). See p. 176.

III. PROCKIEÆ.

29. **Prockia** P. Br.—Flowers hermaphrodite; receptacle slightly convex. Sepals 3, or more rarely 4, 5, valvate, persistent. Petals same in number or fewer, sepaloid, often small, sometimes imbricate, or 0. Stamens ∞, free ∞-seriate; anthers small, subglobose or sub-4-agonal, sublaterally 2-rimose. Germen free, 4, 5-locular; style subulate subentire, stigmatiferous at apex; ovules in each cell ∞, inserted on thick placenta, sometimes 2-lobed. Fruit baccate, indehiscent. Seeds , small, nidulant in pulp; testa crustaceous; albumen fleshy; embryo straight; cotyledons thick, subovate, slightly wider than straight radicle.—Shrubs; leaves alternate-serrate, ∞-nerved at base; stipules lateral, unequal at base; flowers in short, simple or cymose terminal racemes (*Trop. America*). See p. 176.

30. **Hasseltia** H. B. K.[3]—Flowers nearly of *Prockia;* sepals 4, 5, more rarely 3, valvate, finally reflexed persistent. Petals same in number, sepaloid, similarly reflexed and persistent with calyx, valvate or imbricated at apex in bud. Stamens ∞; filaments free, inserted on small discoid receptacle; anthers small extrorse sub-4-agonal, rimose at margin. Germen 2- or more rarely 3-locular; cells complete or finally incomplete, ∞-ovulate;[4] style subulate, stigmatiferous scarcely dilated, sub-3-lobed. Fruit subbaccate, indehiscent; seeds few, descending; albumen fleshy; embryo straight; cotyledons plano-foliaceous.—Trees; leaves 3–5-nerved, 2-glandular at base; flowers crowded[5] in terminal ramified clusters of corymbiform cymes (*Trop. America*[6]). See p. 176.

[1] Genus with dicœcious flowers much resembling *Carpodiptera* (among *Brownlowiæ*) differing by its short stipitate androceum, anther-cells not confluent, and ovary as it seems not winged, and especially in calyx partite as far as base (not as in *Brownlowiæ* campanulate gamophyllous). Characters afterwards like *Grewia;* it also resembles *Euphorbiacea* in flowers and habit.

[2] Spec. 1. *V. alchorneoides* H. Bn., *loc. cit.*

[3] *Nov. Gen. et Spec.*, vii. 231, t. 601.—Endl., *Gen.*, n. 5360.—B. H., *Gen.*, 238, n. 30.—Bocq., in *Adansonia*, vii. 41.

[4] Ovules inserted on exterior side of obovate ascending placenta, ascending.

[5] Small.

[6] Spec. 3. Benth., *Pl. Hartweg.*, 164.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 344.—Walp., *Rep.*, i. 352; *Ann.*, i. 110.

31. **Plagiopteron** Griff.[1]—Sepals 3–5, minute dentiform. Petals 3–5, longer, sepaloid, valvate, finally reflexed. Stamens ∞ ; filaments subfree; anthers 2-locular, subbasifixed, longitudinally rimose above. Germen 3, 4-locular; style subulate, apex stigmatiferous, scarcely thickened, entire; ovules in each cell 2 ascending; micropyle extrorse inferior. Fruit dry obpyramidal, oftener turbinate-3-quetrous, apex expanded in 3, 4 horizontal wings, and finally separating into 3, 4 cocci (indehiscent?).—A scandent shrub; leaves usually opposite,[2] petiolate, entire; stipules minute or 0; flowers[3] in pedunculate ramified cymiferous racemes (*East Ind.*[4]). See p. 176.

32 ? **Solmsia** H. Bn.[5]—Flowers dicœcious; calyx subcampanulate, 4-fid, valvate. Corolla 0. Male flower 8-androus; stamens 4 opposite calyx lobes; 4 others alternate; filaments under rudimentary gynæceum hypogynous free; anthers 2-locular, extrorse, longitudinally rimose. Germen sterile, 4-locular; style small, apex minute capitate. In female flowers stamens sterile, apex glandular. Germen 4-locular; ovule solitary in each cell, inserted at the summit of internal angle, descending; micropyle extrorse superior. Capsule obpyramidal, tapering at base, surrounded by persistent calyx, loculicidal 3, 4-valved; valves inwardly septiferous at middle. Seeds oblong compressed, outwardly fleshy, scantily pilose; chalaza produced below in acute aril; albumen fleshy; embryo axile cylindrical; cotyledons oblong slightly wider than tigella.—Small trees or shrubs, partly fulvous or golden-velvety; leaves alternate, simple attenuate at base, exstipulate, penninerved; primary nerves crowded oblique; flowers at the summit of twigs or in axils of upper leaves in small compound cymiferous racemes (*N. Caledonia*[6]). See p. 176.

IV. ELÆOCARPEÆ.

33. **Elæocarpus** L.—Flowers hermaphrodite or more rarely 1-sexual 4, 5-merous; receptacle produced beyond perianth in a column,

[1] In *Calcutt. Journ.*, iv. 244, t. 13.—B. H., *Gen.*, 238, n. 31.—Bocq., in *Adansonia*, vii. 35.

[2] Sometimes certainly alternate.

[3] Small, oderiferous.

[4] Spec. 1. *P. fragrans* Griff., *loc. cit.*—Walp., *Rep.*, v. 370.

[5] In *Adansonia*, x. 34.

[6] Spec. 2, or 3, unless all varieties of one. H. Br., Adansonia, x. 196.

sometimes very short, disco-glandular-dilated at apex. Sepals free (sometimes coloured), valvate or slightly imbricate. Petals alternate, base inwardly naked or furnished with small glands, either entire or much oftener lobed, or laciniate, sometimes coriaceous subpetaloid, induplicate valvate, each involving ∞ stamens. Stamens either few placed in phalanges 2–4-androus before each petal; alternipetalous, sometimes 4, 5 each; or alternipetalous 0, and 25–30, or ∞ placed in phalanges 4, 5, or 6-androus; filaments erect; anthers subbasifixed elongated, apex muticous or more usually with aristate or cuspidate connective; cells linear introrse or sublateral, more or less long rimose from apex; clefts usually confluent at apex (dehiscing in valves, afterwards 3-angular). Germen sessile; style subulate entire, stigmatiferous at apex; cells 2–5, complete or incomplete; ovules 2, ascending, or ∞. Drupe 1-pyrenous; putamen usually ligneous, hard, or osseous tuberculate, 1–5-locular. Seed usually solitary in each cell, ascending or descending; testa rather thick; albumen fleshy; embryo axile; cotyledons wide, flat, or undulate.—Trees or shrubs; leaves alternate or more rarely opposite, entire or dentate; stipules small or 0; flowers axillary or terminal, solitary, or oftener racemose 1-bracteate; bractlets usually 2 (*Trop. Ins. Asia, and Oceanic Trop. East. Africa.*) See p. 177.

34. **Crinodendron** Mol.[1]—Calyx 5-merous valvate; sepals 5 dentate in sac, afterwards unequally torn and deciduous, connate or free sooner or later near base (*Tricuspidaria*[2]). Petals 5, alternate, entire or sometimes 3-dentate or 3-lobed, induplicate-valvate, and each involving exterior stamens. Stamens ∞, unequally inserted on corolla, more or less elevated beyond receptacle in column, usually short, sometimes outwardly dilated glandular at apex; anthers linear introrse or sublateral; cells often from apex and finally to the base longitudinally rimose; connective sometimes apiculate beyond cells. Germen 3–5-locular; cells ∞-ovulate; style subulate, apex entire or scarcely dilated stigmatiferous. Capsule coriaceous or ligneous, usually angular, loculicidal 3–5-valved or more rarely also more or less

[1] *Chil.* (1782), 314.—Cav., *Diss.*, v. 300, t. 158.—Endl., *Gen.*, n. 5391.—H. Bn., in *Adansonia*, x. 196.

[2] R. & Pav., *Prodr.*, (1794), 64, t. 36; *Syst.*, 112.—DC., *Prodr.*, i. 520.—Endl., *Gen.*, n. 5390.—B. H., *Gen.*, 240, n. 40.—Bocq., in *Adansonia.*, vii. 54.—*Tricuspis* Pers., *Enchirid.*, ii. 9.

high septicidal. Seeds in cells few or 1, descending, ovoid or obovoid; chalaza sometimes produced in aril arched or spirally twisted and fleshy (*Dubouzetia*[1]); embryo albuminous straight; cotyledons flat or rather wide.—Trees or shrubs; leaves alternate or opposite, often serrate; stipules small, caducous or 0; flowers[2] axillary, solitary or 2, 3-nate[3] (*Chili, N. Caledonia*[4]). See p. 180.

35. **Sloanea** L.[5]—Flowers usually hermaphrodite; receptacle shortly convex, sometimes cylindrical, short (*Blondea*[6]), oftener dilated beyond perianth in a convex hemispherical or depressed conical thick glandular and foveolate disk. Sepals 3–5, oftener 4, valvate, sometimes coalescing in truncate calyx, rarely slightly imbricated, or 4, 2-seriate much imbricated (*Echinocarpus*[7]). Petals 0, or rarely 1–4, sepaloid, smaller than calyx, subentire or dentate, sometimes (*Echinocarpus*) larger, unequally incised imbricate (*Echinocarpus*). Stamens ∞, hypogynous; filaments short, foveolate ∞-seriate inserted on disk (where present) ∞-seriate; anthers elongated or more rarely shortened, apiculate or muticous; cells lateral or subintrorse, more or less high rimose from apex. Germen free; cells 3–5, oftener 4, complete or more or less incomplete,[8] ovules ∞; style subulate, stigmatiferous at apex, simple or more or less high, 4–5-fid (*Ablania*[9]). Capsule thick-coriaceous, or oftener woody, densely echinate or more rarely velvety or setose without (*Dasycarpus*,[10] usually 4-locular, 4-valved, sometimes 1–3-valved, or sub-

[1] Panch., ex Br. & Gr., in *Bull. Soc. Bot. de Fr.*, viii. 199; in *Ann. Sc. Nat.*, sér. 5, i. 357; in *Nouv. Arch. Mus.*, iv. 34, t. 13.—B. H., *Gen.*, 240, 987, n. 39.—Bocq., in *Adansonia*, vii. 54.

[2] Large, beautiful, red or golden, sometimes white.

[3] Scarcely to be distinguish from *Elæocarpus*, except by capsule?

[4] Spec. ad 5. Hook., in *Bot. Misc.*, iii. 156, t. 100.—C. Gay, *Fl. Chil.*, i. 337 (*Tricuspidaria*), 340.—Turcz., in *Bull. Mosc.* (1863), i. 576.—Walp., *Ann.*, vii. 458.

[5] *Gen.*, n. 655.—Adans, *Fam. des Pl.*, ii. 382.—J. *Gen.*, 291.—Poir., *Dict.*, vi. 20; Suppl., iv. 635.—Lamk., *Ill.*, t. 469.—DC., *Prodr.*, i. 515.—Endl., *Gen.*, n. 5363.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 62.—B. H., *Gen.*, 238, 987, n. 34.—Bocq., in *Adansonia*, vii. 48.—? *Foveolaria* Meissn., *Gen.*, 36 (28).

[6] L. C. Rich., in *Act. Soc. Hist. Nat. Par.*, 100.

[7] Bl., *Bijdr.*, 56.—Endl., *Gen.*, n. 5062.—Clos., in *Ann. Sc. Nat.*, sér. 4, viii. 266.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 71.—B. H., *Gen.*, 239, 987, n. 35.—Bocq., in *Adansonia*, vii. 49.—F. Muell., *Fragm.*, iv. 91; v. 28 (*Sloanea*).

[8] Whence *Forgetina* (Bocq., in *Adansonia*, vii. 49), a genus of Guinea, sought by us in vain in the Museum of Paris and distinct on account of its parietal placenta, but it seems not to have been preserved (ex B. H., *Gen.*, 987).

[9] Aubl., *Guian.*, 585, t. 234.—Lamk., *Ill.*, t. 479.—DC., *Prodr.*, i. 516.—Endl., *Gen.*, n. 4361.—*Trichocarpus* Schreb., *Gen.*, n. 923.—*Dasynema* Schott (ex Spreng., *Syst. Cur. Post.*, 408).—Endl., *Gen.*, n. 5362.—Bocq., in *Adansonia*, vii. 49.—*Adenobasium* Presl., *Sym. Bot.*, 39, t. 27.—? *Myriochæta* DC., *Prodr.*, i. 515.

[10] Œrst., in *Vid. Medd. Kiobenh.* (1856), 27.

indehiscent. Seeds ∞; albumen copious or scanty; embryo axile; cotyledons foliaceous or (in seeds scantily albuminous) thick, fleshy, slightly plano-convex.—Trees or small trees; leaves alternate or more rarely opposite, simple, entire, sinuate or dentate penninerved; stipules various or 0; flowers axillary, lateral or terminal, solitary or oftener cymose, sometimes cymose-racemose[1] (*Trop. America, Australia, Asia and Madagascar*[2]). See p. 180.

36. **Vallea** Mut.[3]—Flowers 4–5-merous; receptacle short, rather thick; sepals valvate. Petals 3-lobed at apex, imbricate.[4] Stamens ∞, inserted by pairs on slightly thickened annulate glandular receptacle; filament free; anthers basifixed erect, elongate 4-angled, sublaterally from apex to base more or less long rimose. Germen 3–5-locular; ovules in cells 2, ascending; micropyle extrorse inferior; style subulate,[5] apex stigmatiferous, 3–5-lobed. Capsule muricate, externally loculicidal 3–5-valved, rather fleshy, finally dry; endocarp thick ligneous inwardly septiferous between valves. Seeds few, ellipsoid-oblong, shortly acuminate on both sides, exterior smooth; embryo ?—Trees; leaves alternate, ovate-cordate entire; stipules foliaceous or reniform, sometimes 0; flowers terminal or axillary, few, racemose cymose pedunculate[6] (*South West. Mountainous America*[7]). See p. 180.

37. **Antholoma** Labill.[8]—Flowers nearly of *Sloanea*;[9] calyx gamophyllous subconical, apex 4- or more rarely 5-dentate, valvate,

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[1] Does *Phænicospermum javanicum* Miq., (in *Ann. Mus. Lugd.-Bat.*, ii. 68, t. 3;—B. H., *Gen.*, 987, n. 35 *a*), with 4-merous flowers of *Sloanea* and seeds nearly completely involute in miniate aril belong to this genus ?

[2] Spec. ad 40. Plum., *Gen.*, 15 (*Sloanea*). —Sw., *Fl. Ind. Occ.*, ii. 938.—Aubl., *loc. cit.*, t. 212.—Hook., *Icon.*, t. 693, 696.—Moric., *Pl. Nouv. Amér.*, t. 55 (*Adenobasium*).—Griseb., *Fl. Brit. W.-Ind.*, 98.—Benth., *Fl. Austral.*, i. 279 (*Echinocarpus*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 345.—Seem., *Voy. Her., Bot.*, 85, t. 15.—Walp., *Ann.*, vii. 452, 453 (*Dasycarpus, Dasynema, Foveolaria*), 454 (*Echinocarpus*).

[3] Ex L. fil., *Suppl.*, 42.—DC., *Prodr.*, i. 520.—Spach, *Suit. à Buffon*, iv. 49.—Endl., *Gen.*, n. 5389.—B. H., *Gen.*, 238, n. 33.—Bocq., in *Adansonia*, vii. 53.

[4] Lobes also imbricate with each other.

[5] Tubular, inwardly (at apex of dissepiments), imperfectly septate.

[6] Gen., notwithstanding habit, much better referred to section *Tricuspidaria* ?

[7] Spec. 2, 3 (v. all varieties of one ?) R. & Pav., *Prodr.*, t. 14.—H. B. K., *Nov. Gen. et Spec.*, v. 350, t. 489.—Turcz., in *Bull. Mosc.* (1863), ii. 576.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 357.—Walp., *Ann.*, vii. 451.

[8] See ii. 266, t. 41; *Pl. Nouv.-Holl.*, t. 41. —DC., *Prodr.*, i. 565.—Endl., *Gen.*, n. 5162. —H. Bn., in *Adansonia*, ii. 21, t. 1, figs. 1–6.—B. H., *Gen.*, 239, 987, n. 36.—Bocq., in *Adansonia*, vii. 50.

[9] Sometimes aborted polygamous ?

finally, more or less high 1–5-cleft and circumscissile. Corolla gamopetalous truncate-conical, in bud more or less plicate-corrugate, valvate; orifice unequally denticulate. Capsule shortly stipitate, glabrous, ligneous, subglobose, or 4, 5-sulcate, finally 4, 5-valved; valves equally or unequally finally revolute. Seeds ∞, exterior rather fleshy albuminous; embryo . . . .?—Glabrous trees; leaves at apex of twigs alternate petiolate simple coriaceous entire penninerved; flowers[1] in cymiferous racemes subumbellate axillary ? reflexed (*New Caledonia*[2]).

38. **Aristotelia** Lher.[3]—Flowers hermaphrodite or polygamous, receptacle cupuliform, inwardly glandular. Sepals 4, 5, inserted at margin, valvate. Petals 4, 5, inserted with calyx, entire dentate or 3-lobed; præfloration imbricated. Stamens perigynous either 10 by pairs oppositipetalous or 15–∞, others alternate with preceding; filaments free sometimes inserted between 2 alternate crenate rings of disk; anthers subbasifixed or introrse, dehiscing at apex in short clefts, sometimes confluent. Germen inserted at bottom of receptacle (partly inferior); cells 4–5, complete or incomplete; ovules in each cell 2 ascending, anatropous or hemitropous;[4] micropyle extrorse inferior; style subentire 2–5 branched, apex not dilated stigmatiferous. Fruit baccate, furnished with base of receptacle and calyx; cells 2–5, 1, 2-spermous. Seeds ovoid fornicate; testa crustaceous, exterior pulpous sometimes at chalaza produced in corneous aril; albumen fleshy; embryo[5] straight, cotyledons flat or undulate; stipules usually small, deciduous; flowers[6] in cymose racemes, axillary to leaves or bracts (*New Zealand, Tasmania, Chili*[7]).

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[1] "Albis, speciosis."

[2] Spec. 2. Walp., *Ann.*, vii. 454.

[3] *Stirp.*, ii. 31, t. 16.—Gærtn., *Fruct.*, iii. 160, t. 211.—Lamk., *Ill.*, t. 399.—DC., *Prodr.*, ii. 56.—Endl., *Gen.*, n. 5432.—H. Bn., in *Payer Fam. Nat.*, 278.—B. H., *Gen.*, 239, 987, n. 37.—Bocq., in *Adansonia*, vii. 55.—*Friesia*, DC., *Prodr.*, i. 520.—Endl., *Gen.*, n. 5387.—*Beaumaria*, Endl., *loc. cit.*

[4] Coats 2-plicate.

[5] Sometimes green.

[6] Small, sometimes virescent.

[7] Spec. 4, quar. 2 Novo-Zeland. Labill., *Pl., Nouv-Holl.*, ii., t. 155 (*Elæocarpus*).—R. & Pav., *Prodr.*, t. 12.—Hook., *Icon.*, t. 601 (*Friesia*).—Spach, *Suit. à Buffon*, iv. 48 (*Friesia*).—C. Gay, *Fl. Chil.*, i. 335.—Benth, *Fl. Austral.*, i. 279.—Hook. f., *Handb. N.-Zeal. Fl.*, 33; *Fl. Tasm.*, i., 52.—Phil., in *Linnæa*, xxxiii., 31.—Walp., *Ann.*, vii. 454.

XXVIII. DIPTEROCARPACEÆ.

I. DRYOBALANOPS SERIES.

Dipterocarpus, which has given its name to this small family, has partly irregular flowers. It is not the same with *Dryobalanops*[1]

Dryobalanops aromatica.

FIG. 211.
Floriferous and fructiferous branch ($\frac{1}{3}$).

(figs. 211–214), where they are regular, hermaphrodite and pentamerous. The receptacle is slightly concave. It bears five sepals and five alternate petals, nearly all equal, both a little perigynous,

[1] GÆRTN. F., *Fruct.*, iii. 50, t. 187, 188.—COLEBR., in *Asiat. Res.*, xii. 536.—ENDL., *Gen.*, n. 5393.—DE VRIESE, in *Ned. Kruidk. Arch.*, iii. 38, t. 1; *Mém. sur le Camphr. de Sum. et de Born.*, c. tab.—B. H., *Gen.*, 191, n. 1.—H. BN., in *Payer Fam. Nat.*, 272.—OUDEM., in *Ann. Sc. Nat.*, ser. 4, v. 90, t. 4.—A. DC., *Prodr.*, xvi. 606, n. 1.—*Pterygium* (part.) CORR., in *Ann. Mus.*, x. 159, t. 8, fig. 2 (nec SW.).

the former quincuncially imbricated, the latter contorted in præfloration; the stamens, also slightly perigynous, are free, and each formed of a short filament and an elongated anther with narrow connective, a little flattened, elongated into a point above the linear cells, slightly introrse or almost marginal, dehiscing longitudinally. The gynæceum is almost entirely free, superior, formed of a three-

Dryobalanops aromatica.

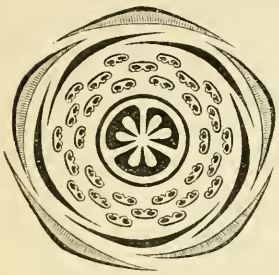

Fig. 212.
Floral diagram.

Fig. 213.
Long. sect. of flower ($\frac{2}{1}$).

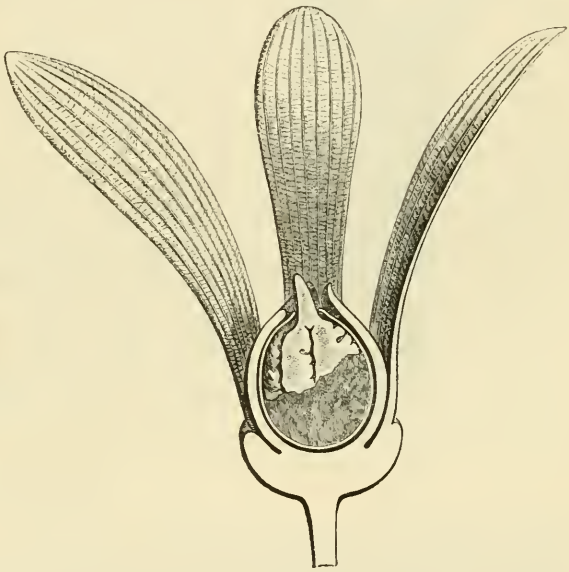

Fig. 214.
Long. sect. of fruit.

celled ovary, complete or incomplete, surmounted by a style the stigmatiferous apex of which is slightly dilated, hollowed, and crenate upon the edges. In the internal angle of each cell may be observed two collateral descending incompletely anatropous ovules, with the micropyle looking upwards and outwards. The fruit is a capsule opening from the apex into three panels with a triangular summit. It is set in a short basilar cupule, supporting upon its edges five large elongated wings, obtuse at the apex, nearly equal to each other, membranous, rigid or almost coriaceous. In the capsule is found a seed, or more rarely two, which often germinate in the interior of the pericarp (fig. 214). Each of them encloses under its coats

a large fleshy embryo, the contortuplicate cotyledons of which are very irregularly lobed, ruminated, and very unequal among themselves, the larger one completely enveloping the smaller,[1] around which it is convoluted. The radicle is superior and conical, longer or shorter according to the age of the seed. Only one species of this genus is known at present, *D. aromatica*,[2] better known under the name of Camphor tree of Sumatra or Borneo. It is a fine tree, with resinous juice, its alternate leaves being simple, entire, coriaceous, penninerved, with numerous secondary nerves, oblique, parallel, with short petiole, accompanied at its base by two small very caducous stipules. Its flowers are disposed at the summit of the branches or in the axils of the superior leaves in ramified clusters, upon whose axes they are alternately inserted, articulated upon a little prominent cushion, below which is found the transversal cicatrice of a bract.

Dipterocarpus trinervis.

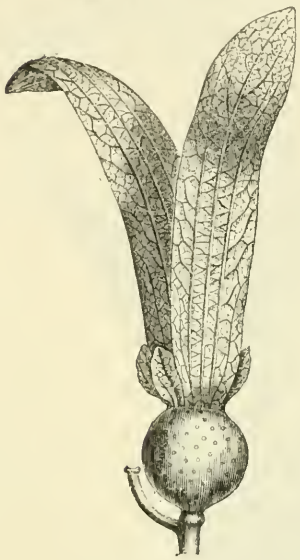

Fig. 215.
Fruit[3] ($\frac{1}{2}$).

In the *Dipterocarpeæ* (fig. 215), the general organization of the flower is the same, especially as to the corolla and sexual organs; but the gamosepalous tubular calyx is cut above into five very unequal teeth, at first slightly imbricated, then valvate, or even ceasing to touch each other by their edges. Two of them develop much more than the other three, and form above the fruit, which is closely enveloped by the general part of the calyx, two long erect rigid wings almost coriaceous and reticulate. The woody indehiscent pericarp encloses

[1] The latter being not only much narrower but much shorter than the other. A false vertical partition, incomplete in its upper part, and terminating at this point in an oblique, irregular edge, separates the largest of the cotyledons in its lower part into two almost symmetrical halves.

[2] Gærtn. f., *loc. cit.*—Bl., *Mus. Lugd.-Bat.*, ii. 38.—*D. Camphora* Colebr., *loc. cit.*, c. ic.—Jack, *Mal. Misc.*, in *Hook. Comp. to Bot. Mag.*, 1, 264.—Miq., *Fl. Ind.-Bot.*, 1, p. ii. 500; *Prodr. Fl. Sum.* 191.—Hook. f. in *Trans. Linn. Soc.*, xxiii. 160.—*Shorea camphorifera* Roxb., *Fl. Ind.*, ii. 616.—*Pterygium teres* Corr., *loc. cit.*—*Dipterocarpus Dryobalanops* Steud.—*D. teres* Steud.—*Camphora sumatrensis* W. T. Rhyne, in *Breyn. Prodr.*, 9.—Rumph., *Herb. Amboin., Auct.*, 67.

[3] Fig. reduced from *Fl. Jav.* of Blume (*Dipterocarp.*, t. 1).

one or two seeds with an embryo having lobed corrugate or contortuplicate cotyledons. In this genus the leaves are accompanied by large stipules enveloping the buds, and are afterwards detached at their base leaving upon the branches a large circular cicatrice.

Beside the *Dipterocarpeæ* is placed *Anisoptera*, having also a fruit accompanied by two large wings, but which is distinguished from them inasmuch as its ovary and fruit are partly at least inferior in reference to the insertion of the calyx, but adnate to a concave receptacle, the edges of which bear the perigynous perianth and androceum. Their ovary is surmounted by a full conical projection, which in itself would seem to resemble a superior ovary. It is almost impossible at the adult age, and from dry specimens, to determine the mode of arrangement of the stamens in the preceding genera; but when the number becomes defined, or nearly so, it can be seen that they are arranged in verticils. It is so in certain *Vaticas*, with 10 or 15-androus flowers. They have five oppositipetalous stamens, five others alternipetalous, then, outside each of these latter, a very small stamen, situated in the same vertical plane. The stamens may also be more numerous in this genus; but it is always distinguished from the preceding by its calyx, which is subvalvate, or with the pieces not touching each other in the bud, and forming round the fruit five large free wings, unequal or nearly equal, not adhering to the pericarp, and not forming round it by their bases a sac enveloping it closely.

Beside *Vatica* are ranged *Pachynocarpus*, having the same flowers, but with a concave receptacle, in which the fruit is encased, as in *Anisoptera*, and a calyx which disappears round the fruit; and *Vateria*, having the free ovary of *Vatica*, but a small calyx, not accrescent, and reflexed under the pericarp; *Monoporandra*, which, with the fruit of *Vateria*, has only five stamens to the androceum; *Hopea*, having the flower of *Vateria*, and two only of the five non-adherent sepals dilated in wings round the fruit; *Shorea*, very analogous to *Hopea*, has three sepals accrescent in large wings, and two others much less developed; lastly, *Doona*, the fruit of which, also accompanied by three large wings, encloses an embryo with cotyledons much contortuplicate, instead of being thick and fleshy, plano-convex, as in the preceding genera, the flowers being otherwise sensibly the same.

II. ANCISTROCLADUS SERIES.

The flowers of *Ancistrocladus*[1] (fig. 216) are regular, with a receptacle in the form of a cup, upon the edges of which are inserted five sepals, often unequal, disposed in the bud in quincuncial præfloration. The androceum is generally formed of ten stamens perigynously inserted like the perianth and superposed, five to the sepals, and five, smaller, to the petals. These latter are sometimes wanting. Each is formed of a filament swollen towards its base, and of a two-celled introrse anther, often versatile, dehiscing by two longitudinal clefts. The gynæceum is composed of an ovary, partly inferior, and lodged in the cavity of the receptacle, surmounted by three divergent styles tapering at the base,[2] and swelling towards their summit into stigmatiferous heads. The apex of the ovary is full, hemispherical or conical, and its lower part is hollowed into a single inferior cell, in which is found one lateral, or almost basilar, ascending anatropous ovule[3] with micropyle looking downwards. The fruit is coriaceous, indehiscent, monospermous, encased below in the receptacle and surrounded by five sepals growing into more or less rigid membranous wings. The seed encloses under its thin coats a thick coriaceous albumen deeply ruminate, an axile embryo, the cotyledons of which are divaricate, much broader than long, and sometimes truncate at the apex, with an inferior radicle often dilated and truncate at the apex. *Ancistrocladus* consists of climbing and glabrous shrubs with branches often hooked, and alternate sessile or petiolate, simple, entire, coriaceous, penninerved, reticulated leaves with small stipules, often caducous. The flowers[4] are disposed in ramified clusters of cymes either terminal or borne laterally

Ancistrocladus guineensis.

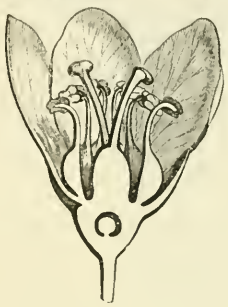

Fig. 216.
Long. sect. of flower.

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[1] Wall., *Cat.*, n. 1052 (1828).—Pl., in *Ann. Sc. Nat.*, sér. 3, xiii. 316.—Thw., in *Trans. Linn. Soc.*, xxi. 233, t. 24; in *Journ. Linn. Soc.*, vii. 111.—B. H., *Gen.*, 191, 981, n. 3.—Schnizl., *Iconogr.*, t. 213.—A. DC., *Prodr.*, xvi. 601 (ord. 29 *bis*).—*Wormia* Vahl, in *Scr. Nat. Selsk. Kjobenh.*, vi. (1810), 104 (nec Rottb.)—*Bigamea* Kœn., mss. ex Endl. *Gen.*, n. 6095 (1840).—Dyer, in *Fl. of Ind.*, i. 299.

[2] Articulate perhaps at this level.

[3] Or incompletely campylotropous (?).

[4] Often small, articulate, caducous.

upon the unciform axes. Seven or eight species[1] of this genus are known, principally natives of the warmest regions of Asia and Malaysia. One or two species inhabit tropical Western Africa.

III. LOPHIRA SERIES.

Lophira[2] (figs. 217–221) has regular hermaphrodite flowers. Upon the narrow flat receptacle is inserted a subhypogynous perianth, composed of five sepals, subequal, free, or nearly so, and quin-

Lophira alata.

FIG. 217.
Flower.

FIG. 218.
Long. sect. of flower ($\frac{3}{2}$).

cuncially imbricated, and of five alternate petals, contorted or imbricated in the bud. The androceum is formed of a very considerable number of stamens. The filaments are free except at the base, and surmounted by an anther with two equal linear cells, introrse and dehiscing longitudinally.[3] The gynæceum is free; it is formed of a one-celled[4] conical ovary, terminated by a style with two

[1] AZN., in *Nov. Acta Nat. Cur.*, xviii. p. 1.—WIGHT, *Icon.*, t. 1987, 1988.—THW., *Enum. Pl. Zeyl.*, 188.—OLIV., *Fl. Trop. Afr.*, i. 174.—WALP., *Ann.*, ii. 175; iv. 339; vii. 378.

[2] BANKS, in *Gærtn. Fruct.*, iii. 52, t. 188.—ENDL., *Gen.*, n. 5397.—PAYER, *Fam. Nat.*, 40.—B. H., *Gen.*, 192, n. 7.

[3] For a certain distance, beginning at the apex; which has caused it to be possible at a certain age to consider them as pores.

[4] There are found, it is true, two parietal rudiments of vertical partitions corresponding on each side to the interval of two neighbouring series of ovules; but they are little prominent in the cavity of the ovary. Nevertheless, with the two branches of the style, they would seem to show that the gynæceum is really dicarpellary.

short subulate reflexed branches generally disappearing early. From the base of the cell rises a central placenta, bearing on each side two rows of rather numerous ascending imbricated anatropous ovules, with the micropyle looking downwards and outwards. The fruit is dry, indehiscent, generally monospermous; and round it persists the calyx, its pieces more or less accrescent, and becoming dry, rigid, very unequal wings. One of these surpasses all the others in length.[1] The seed encloses under its coats a large fleshy embryo,

Lophira alata.

FIG. 219.
Gynæceum ($\frac{4}{1}$).

FIG. 220.
Placenta bearing ovules ($\frac{8}{1}$).

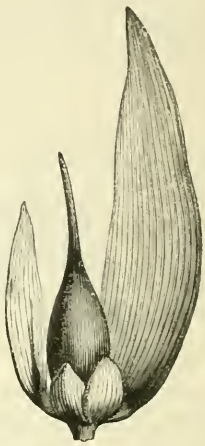

FIG. 221.
Fruit ($\frac{1}{2}$).

with inferior radicle, and thick subequal cotyledons. Only one species of this genus is known—*L. alata*.[2] It is a fine pyramidal tree, native of Western Tropical Africa. The leaves are alternate, simple, entire, elongated, often undulated, penninerved, and the nerves parallel, numerous, scarcely reticulated. The flowers[3] are collected at the apex of the branches, or in the axils of the leaves, in more or less ramified compound racemes.

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[1] It represents the most exterior sepal. Sepal 2 is often tolerably developed in the flower and round the oblong pointed fruit. The inequality of the leaves begins from the bud, where sepals 3, 4, and 5 are shortest, almost orbicular, obtuse, membranous, while the other two, which are thicker, approach the lanceolate form.

[2] BANKS, *loc. cit.*—GUILLEM. & PERR., *Fl. Seneg. Tent.*, i. 109, t. 24.—OLIV., *Fl. Trop. Afr.*, i. 174.—WALP., *Rep.* v. 128.—*L. simplex* DON, *Gen. Syst.*, i. 814.—*L. africana* DON (ex A. DC. *Prodr.*, xvi. 639).

[3] Whitish.

Blume,[1] in 1825, established this small family, since then admitted by all botanists.[2] Before him the known genera which belong to it were placed by A. L. de Jussieu[3] in the order of Guttifers; Lindley, who left them in his Guttiferal Alliance, included in it the genera *Dipterocarpus, Anisoptera, Dryobalanops, Vateria, Vatica* and *Hopea*. Endlicher placed beside them *Lophira*, considered by several authors as the type of a distinct group,[4] because of the mode of placentation of the one-celled ovary. He re-included in the genus *Vatica*, Roxburgh's *Shorea*, now considered as distinct; since then the English botanists have added to the family the three genera *Doona*,[5] *Monoporandra*[6] and *Pachynocarpus*,[7] and have incorporated there the *Ancistrocladus* of Wallich,[8] of which it had also been proposed to make a distinct family.[9] This exceptional type has affinities with *Lophira*, the *Hugoneæ, Symploceæ*,[10] *Gyrocarpeæ, Combretaceæ*,[11] &c. Apart from this genus and *Lophira*, which recalls in certain respects the *Clusiaceæ*, and *Hypericaceæ* with one-celled ovary, the whole of the group is certainly nearly allied to *Tiliaceæ* and *Ternstræmiaceæ*. From the former it differs principally by the imbricated præfloration of the calyx, the form of the receptacle, which is often concave, being slightly perigynous, the organization of the seed and the development which is frequent in the sepals round the fruit. These latter features separate it pretty clearly in most cases from the *Ternstræmiaceæ*,[12] the calycinal præfloration of which is the same. In 1846 Lindley reckoned forty eight species of *Dipterocarpaceæ;* a hundred are now admitted, all natives of the warmest regions of Asia and tropical Oceania, except three or four belonging to Western or Central Africa. All are trees or shrubs with resinous or camphorous juice, sometimes climbing, with alternate penninerved leaves, entire or finely crenate. The stipules are small or wanting, sometimes very large

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[1] *Bijdr.*, 222 (*Dipterocarpeæ*).

[2] Endl., *Enchirid.* (1841), 525, ord. 215; *Gen.*, 1012, ord. 213 (*Dipterocarpeæ*).—Lindl., *Veg. Kingd.* (1846), 393, ord. 141 (*Dipteraceæ*).—B. H., *Gen.*, 189 (1862), ord. 29.—A. DC., *Prodr.*, xvi. 604, ord. 29 *ter.*

[3] *Gen.* (1789).

[4] *Lophiraceæ* Endl., *Gen.*, 1014.—Lindl., *op. cit.*, 395.—A. DC., *Prodr.*, xvi. 638.

[5] Thw., in *Hook. Lond. Journ.*, iii. (1844).

[6] Thw., in *Hook. Lond. Journ.*, vi. (1847).

[7] Hook. f., in *Trans. Linn. Soc.*, xxiii. (1860).

[8] *Cat.*, n. 1052 (1828).

[9] Pl., *Ess. Monogr. of a New Fam. de Pl. prop.* under the name of *Ancistrocladeæ* [in *Ann. Sc. Nat.*, sér. 3, xiii. (1849), 316].

[10] Pl., *loc. cit.*, 319.

[11] Oliv., *Fl. Trop. Afr.*, i. (1868), 175.

[12] "A *Ternstræmiaceis Dipterocarpeæ* differ. imprim. calyce fructif. sæpiss. ancto et sem. solit. exalbum., cotyl. magn. crass., id quod in illis, nisi in paucis gen. inter *Gordonieas*, non observatur." (B. H., *loc. cit.*, 190.)

and caducous, leaving an annular cicatrice upon the branch. The characters which serve to distinguish most of the genera from each other are drawn from the greater or less depth of the receptacle, its adherence with the base of the ovary, from the total independence of the latter, and especially from the characters of the sepals, their præfloration a little before anthesis, and the number of those leaves which grow into wings after anthesis.[1] As to the most important features of organization, drawn from the mode of placentation and the number and direction of the ovules in each cell, they have been used by us to distinguish in the family the three following series :—

I. Dryobalanopseæ.—Ovary plurilocular ; two ovules in each cell, descending with exterior and superior micropyle.—(10 genera.)

II. Ancistrocladeæ.—Ovary unilocular; partly inferior with single ovule subbasilar ascending with inferior micropyle.—(1 genus.)

III. Lophireæ.—Ovary unilocular, almost entirely superior, with a basilar placenta and numerous ovules, ascending with inferior micropyle.—(1 genus.)

This group consists principally of fine trees, the wood of which is hard, durable, and much esteemed for building purposes in tropical Asia. All their organs, moreover, generally contain a balsamic resinous juice which may appear under the form of an oily liquid, or under that of solid concrete crystalline masses. In this particular the most celebrated species is the Camphor tree of Borneo and Sumatra, that is to say, *Dryobalanops aromatica* Gærtn.[2] (figs. 211–214). When the trunk is very old it is cut down, and then split longitudinally to obtain the camphor accumulated in the interior fissures of the wood, under the form of small crystals of a yellowish white. This is the solid camphor or Borneo camphor, known in Sumatra under the name of *Kassar Baras*, and which in our country

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[1] Bentham & Hooker (*loc. cit.*, 190) have arranged two distinctive lists of genera according to these characters.

[2] See p. 204, note 2. Endl., *Enchirid.*, 526. —Mér. & Del., *Dict. Mat. Méd.*, ii. 46, 690.—Lindl., *Veg. Kingd.*, 294; *Fl. Med.*, 146.—Guib., *Drog. Simpl.*, éd. 6, iii. 635, fig. 471.—Pereira, *Elem. Mat. Med.*, ed. 4, ii. p. ii. 552. —Rosenth., *Syn. Pl. Diaphor.*, 735.—Hook. f., in *Trans. Linn. Soc.*, xxii. 160.—*Abor Camphoræ* Wilh. ten Rhyne, in *Breyn. Prodr.* (1683); Grimm, *Obs.*, in *Misc. Cur. Siv. Eph. Nat. Cur.* (1683), 371, t. fig. 33.—*Abor camphorifera* Valent., *Ind. Litt.*, 488 (1716); *Hist. Simpl. Reform.*, lib. 2, sect. 6, 250.—Rumph., *Herb. Amboin.*, lxxxii. 67 (1775).—C. Mill., in *Phil. Trans.*, lxviii., p. i. 161, 170, 188. —*Laurus foliis ovalibus acuminatis lineatis, florib. magn. tulip.* Houtt., *Nat. Hist.*, ii. 2, 318.

is more the object of scientific curiosity, as the alcohol of the camphor of Japan or China, than an article of consumption. Its price is very high; and the Rajahs of Sumatra rather than enrich themselves by exporting it, use it almost entirely in their country to preserve the bodies of their friends during the long period which precedes their interment.[1] It is said to be frequently employed in China and Japan as a tonic and stimulant. *Dryobalanops* furnishes besides a yellowish balsamic oil, called *oil of camphor*, which is obtained by incisions, and collected in small quantities in a half cylinder of cleft bamboo. It is afterwards strained and put in bottles to preserve it. Several other species of this family produce thus a kind of *wood oil* (*huile de bois* as it is called in the French possessions of Cochin China), used as a vulnerary and employed for a number of industrial purposes. These are principally *Dipterocarpus* and *Anisoptera*. They are on this account analogous to *Vateria indica*,[2] from which is obtained a false resin, called copal in India, and, when fresh, appearing under the form of a liquid varnish called *Pimen dammar*, or Piney varnish, in British India; it is solid, tenacious, but has the inconvenience of melting at a moderately low temperature (36°·5 Centig.). According to Wight it is obtained by making incisions in the trunk of the tree; the liquid collects and hardens on a level with the solution of continuity. Upon the coast of Malabar wax lights are made of it, which give a brilliant light and exhale a perfumed odour. The balsamic and resinous juice of *Dipterocarpus trinervis* (fig. 215) is used in Java, according to Blume, in the preparation of an excellent unguent applied with success to wounds; and it furnishes a dye, or with the yolk of egg an emulsion producing the same effects as the copaivi balsam. The natives of the country coat the leaves of the Banana tree with this resin, and afterwards make them into torches which give a white light, and have not a disagreeable odour. Several other species of *Dipterocarpus* afford analogous productions, wood oils which are used like the copaivi for domestic and industrial purposes. Such are those from which is extracted the *Gurjun* of the Indians (in Cingalese, *Dhronatil*). The principal species so used are *D. lævis*

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[1] See De Vriese, in *Hook. Lond. Journ.*, iv. (1852), 33, 68.—Hook., *Journ.*, iv. 200.

[2] L., *Spec.*, 734.—Gærtn. f., *Fruct.*, iii. t. 189.—Roxb., *Fl. Ind.*, ii. 602.—Lindl., *Fl. Med.*, 145.—*Hemiphractum* Turcz., in *Bull. Mosc.* (1859), i. 262.—*Elæocarpus copalliferus* Retz., *Obs.*, iv. n. 85.—*Pacnoe* Rheed., *Hort. Malab.*, iv. t. 15 (vulg. *Peini marum*).

Ham., *alatus* Roxb., *incanus* Roxb., *costatus*, Gærtn. The *Dammar selan* of Malaya is an analogous resinous product extracted from the *Vatica Selanica* Wight & Arn. In Borneo the concrete juices of *V. Balangeran* Korth. (*Njuting Mabambong*), *V. Sangal* Korth. and *V. Rassak*, Bl. (*Njuto*) are also used. *V. robusta* Wight & Arn., of India exudes a kind of incense which is burnt in the temples under the name of *Ral* or *Doona*. *Shorea Tumbugaia* produces an analogous matter used to coat ships. *S. Jala*, Buch., gives a sort of gum-lac. A kind of balm is still burnt at their religious feasts extracted from *Vateria lanceolata*, Roxb. In short all these trees have a juice possessing very homogeneous qualities, more or less solidifiable, combustible, often odoriferous, resinous, balsamic, furnishing oils, varnishes, tar, and sometimes camphorous substances. This is to a certain point a distinctive character to add to those of the *Dipterocarpæ*. Their wood is hard, beautiful, fit for building purposes. In Java and Borneo are especially employed *Dipterocarpus gracilis* Bl., *marginatus* Korth., *littoralis* Bl., *trinervis* Bl., *retusus* Bl., *Spanoghei* Bl.; in India that of *Shorea robusta* (vulg. *Saul*), several *Vaticas* and *Vaterias:* these are trees, like the *Dryobalanops*, often attaining a height of a hundred feet. The authors of the *Floræ Senegambiæ Tentamen* say of the *Lophira alata* (figs. 217–221) that "the beauty of this tree, as to its foliage and flowers, ought to draw the attention of horticulturists; and would be a valuable acquisition to our greenhouses, and to the inter-tropical colonies of Asia and America."

GENERA.

I. DRYOBALANOPSEÆ.

1. **Dryobalanops** GÆRTN.—Flowers hermaphrodite, receptacle rather concave. Sepals 5, slightly connate and perigynous at base, subequal imbricate. Petals 5, alternate, sometimes very slightly coalescing at base, contorted. Stamens ∞, ∞-seriate; filaments short; anthers introrse; cells 2, linear; valves equal, connective apiculate. Germen free, almost entirely superior, 3-locular; style slender entire, apex stigmatiferous not thickened; ovules in each cell 2, collaterally descending; micropyle extrorse superior. Fruit capsular subligneous semi-included in accrescent base of calyx, lobes subequal, wing-shaped accrescent; pericarp finally 3-valved at apex. Seeds 1 or more rarely 2; cotyledons of embryo exalbuminous, fleshy, very unequal, contortuplicate, the larger involving the smaller; radicle superior thick, vertical, pericarp intruded in false dissepiments between folds of embryo and laterally sub-2-winged.—A glabrous resinous camphorous tree; leaves alternate petiolate entire coriaceous, crowded lineate-penninerved; stipules minute or scarcely seen; flowers at the summit of twigs or in axils of upper leaves, cymose-racemose; each 2-bracteolate (*Indian Archipelago*). See p. 210.

2. **Dipterocarpus** GÆRTN. F.[1]—Flowers outwardly irregular; summit of receptacle usually slightly concave. Calyx free, gamosepalous; tube free, 5-fid or 5-dentate at apex; lobes very unequal; larger generally 2; all when young slightly imbricated; afterwards valvate or open. Corolla contorted and stamens ∞, slightly perigynous (of *Dryobalanops*); anthers elongated, cells linear introrse rimose; connective more or less produced beyond cells, acuminate. Germen inferior at base 3-locular (of *Dryobalanops*), style slender, apex entire or shortly 3-dentate. Fruit dry subwoody, indehiscent,

[1] *Fruct.*, iii. 50, t. 187, 188.—ENDL., *Gen.*, n. 5393.—SPACH, *Suit. à Buffon*, xiii. 303.—ENDL., *Gen.*, n. 5392.—B. H., *Gen.*, 191, 981, n. 2.—H. BN., in *Payer Fam. Nat.*, 273.—A. DC., *Prodr.*, xvi. 606.—*Pterygium*, CORR., in *Ann. Mus.*, viii. 397, t. 6.—? *Caryolobia* GÆRTN., *Fruct.*, i. 215, t. 45 (ex ENDL.).—*Mocanera* BLANC. (Nec. J.).

closely surrounded by free sacciform accrescent base of calyx (tuberculate, costate, longitudinally winged or transversely lamellate) and crowned with very unequal (smaller 3, larger 2, wing-shaped) erect, rather rigid, venose lobes. Seeds free; cotyledons of exalbuminous embryo unequal, thick, fleshy, corrugate, lobed, or contortuplicate; radicle superior.—Tall resinous trees; leaves alternate coriaceous, entire or sinuate-dentate, parallel penninerved, transversely venose between nerves; stipules large, valvate, closed, including germen, afterwards circumscissile at base, leaving annular cicatrice, deciduous; flowers[1] in scanty axillary racemes (*Asia and Trop. Oceania*[2]).

3. **Anisoptera** Korth.[3]—Flowers nearly of *Dipterocarpus*, receptacle obconical concave. Sepals perigynous, scarcely connate at base, lanceolate, at first imbricated, finally subvalvate or open. Corolla contorted and stamens ∞; connective subulate-cuspidate; exterior valve of cells, usually larger. Germen 3- or more rarely 2- or 4, 5-locular, partly inferior; ovules of *Dipterocarpus*; style . . . .? thick conical, apex attenuate very shortly 2–5-fid. Fruit capsular, indehiscent, partly inferior; seed 1 (of *Dipterocarpus*); sepals 2, wing-shaped, accrescent round fruit as in *Dipterocarpus;* smaller 3; all inserted on receptacle adnate to fruit (i.e. subepigynous).—Resiniferal trees; leaves of *Dipterocarpus;* stipules small or minute, caducous; flowers in loose compound ramified terminal racemes (*Eastern Tropical India, Archipelago*[4]).

4. **Vatica** L.[5]—Flowers subregular; receptacle narrow subplane or rather concave. Sepals 5, free or connate at base, imbricate when young, afterwards subvalvate or open. Corolla contorted. Stamens usually 15,[6] of which 5 are oppositipetalous; 5 other alternipetalous, larger;

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[1] Often rather large handsome odoriferous, whitish pink or somewhat purple.

[2] Spec. ad 25. Roxb., *Pl. Coromand.*, t. 213.—Bl., *Fl. Jav. Dipteroc.*, 8, t. 1-6; *Mus. Lugd.-Bat.*, ii. 35, t. 4.—Korth., *Verh. Nat. Gesch. Bot.*, t. 5.—Wight & Arn., *Prodr.*, i. 84.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 496; *Prodr. Fl. Sum.*, 190, 485; *Mus. Ludg.-Bat.*, i. 213.—Thw., *Enum. Pl. Zeyl.*, 23.—Hook. f., in *Trans. Linn. Soc.*, xxiii. 159—Turcz., in *Bull. Mosc.* (1863), i. 576.—Walp., *Rep.*, v. 121; *Ann.*, iv. 335; vii. 377.

[3] *Verh. Nat Gesch. Bot.*, 65, t. 6.—B. H., *Gen.*, 192, n. 4.—*Anterotriche* Turcz., in *Bull. Mosc.* (1846), ii. 505.

[4] Spec. 4, 5. Bl., *Mus. Lugd.-Bat.*, ii. 41, t. 6.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 500; *Prodr. Fl. Sum.*, 191, 485.—A. DC., *Prodr.*, 614.—Walp., *Rep.*, v. 124; *Ann.*, i. 113 (*Anterotriche*); iv. 335 (part.); vii. 378.

[5] *Mantiss.*, ii. 152.—J., *Gen.*, 259.—Poir., *Dict.*, viii., 418.—*Ill.*, t. 397.—DC., *Prodr.*, i. 517.—Spach, *Suit. à Buffon*, xiii. 310.—Endl., *Gen.*, n. 5395.—B. H., *Gen.*, 192, 981, n. 6.—*Pteranthera* Bl., *Mus. Lugd.-Bat.*, ii. 30.—*Sunaptea* Griff., *Notul.*, iv. 56, i.—*Monotes* A. DC., *Prodr.*, 623.

[6] In African species ∞ (Oliv.).

5 smaller superposed, or more rarely ∞ ; filaments sometimes dilated at base ; anthers ovate or more usually oblong or linear, introrse, inwardly longitudinally rimose ; exterior valve of cells usually larger ; connective usually produced beyond cells, apiculate. Germen entirely or for the greater part free, incomplete or complete, 3 or more rarely 2-locular ; style either shortly terete, stigmatiferous clavate or capitate at apex, or longer subulate entire or 3-denticulate at apex. Ovules in each cell 2, descending ; micropyle extrorse superior. Capsule indehiscent or 3-valved 1, 2-spermous, furnished with variously accrescent equally or unequally wing-shaped patent, free base of sepals ; seeds exalbuminous ; embryo fleshy ; cotyledons subequal or unequal thick plano-convex.—Resinous trees ; leaves alternate entire coriaceous penninerved reticulate-venose ; stipules small or very fugacious sometimes 0 ; flowers in compound often much ramified terminal racemes[1] (*Asia and Tropical Africa*[2]).

5. **Pachynocarpus** Hook. f.[3]—Flowers of *Vatica ;* lanceolate lobes of perigynous calyx imbricated when young, disappearing in fruit. Stamens 15. Germen 3-locular, base inferior adnate to interior of concave receptacle. "Fruit subglobose thick-coriaceous, indehiscent, surrounded by truncate adnate receptacle. Testa of seed thin ; cotyledons thick-fleshy convolute-lobed."—A lofty resinous tree ; leaves alternate entire penninerved reticulate-venose ; stipules . . ? ; flowers[4] in much ramified cymiferous racemes[5] (*Borneo*[6]).

6. **Vateria** L.[7]—Flowers nearly of *Vatica ;* receptacle sometimes rather concave. Sepals subequal, imbricated. Stamens sometimes

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[1] Sect. 2, i.e. : 1. *Isauxis* (Arn., in *Wight Ill.*, i. 88.—*Retinodendron* Korth., *Verh. Nat. Gesch. Bot.*, 55, t. 8.—*Seidlia* Kost., *Med. Ph. Bot.*, 1945, ex Endl.) ; fructiferous sepals subequal, ovate, or wide at base.—2. *Euvatica* (B. H., *loc. cit.*) : fructiferous sepals wing-shaped, very unequal, not connivent round base of fruit.

[2] Spec. 8, 9. Sm., *Icon. ined.*, t. 36.—Wight & Arn., *Prodr.*, i. 84 ; *Icon.*, t. 26 (*Vateria*). —Bl., *Mus. Lugd.-Bat.*, ii. 30, t. 7.—Miq., *Fl. Ind.-Bat.*, i., p. ii. 503 ; *Prodr. Fl. Sum.*, 191, 486 ; *Mus. Lugd.-Bat.*, i. 214.—Hook. f., in *Trans. Linn. Soc.*, xxiii. 160 (*Anisoptera*).—Welw., in *Trans. Linn. Soc.*, xvii. t. 5 (ex Oliv., *Fl. Trop. Afr.*, i. 173).—Walp., *Ann.*, iv. 337 ; vii. 378.

[3] In *Trans. Linn. Soc.*, xxiii. (1860), 159, t. 22.—B. H., *Gen.*, 192, n. 5.

[4] Very odoriferous.

[5] Gen. "except in fruit not differing from Vatica."

[6] Spec. 1. *P. umbonatus* Hook. f., *loc. cit.* —Walp., *Ann.*, vii. 378.

[7] *Gen.*, n. 666.—J., *Gen.*, 158.—Gærtn., *Fruct.*, iii. 53, t. 189.—Poir., *Dict.*, viii. 417 ; *Ill.*, t. 475.—DC., *Prodr.*, i. 83.—Spach, *Suit. à Buffon*, xiii. 309.—Endl., *Gen.*, n. 5395.—H. B., in *Payer Fam. Nat.*, 273.—B. H. *Gen.*, 198, n. 11.

15, 3-seriate; cells quite connate from apex (*Stemonoporus*[1]), sometimes, more rarely ∞; valves of anthers distinct at apex and subulate-acuminate[2] (*Hemiphractum*[3]). Germen of *Vatica*, 3-locular; style subulate. Capsule globose or ovoid, coriaceous or subfleshy, furnished with base of sepals scarcely accrescent and reflexed, indehiscent or 3-valved. Embryo of thick seed fleshy; cotyledons unequal, usually involute or corrugate-lobed, enclosing superior radicle.—Resinous glabrous, furfuraceous, or tomentose trees; leaves entire coriaceous penninerved reticulate-venose; stipules small or almost wanting, deciduous, more rarely larger, persistent; flowers axillary, 1–3-nate or oftener in racemose axillary simple or terminal ramified cymes, sometimes 1-lateral (*Trop. Asia*[4]).

7. **Monoporandra** Thw.[5]—Flowers small, nearly of *Vateria*; stamens 5, alternipetalous; anther valves[6] subequal or unequal; connective muticous. Germen, small fruit, fructiferous calyx, and seed of *Vateria*.[7] Ramified glabrous or slightly tomentose trees; leaves entire coriaceous penninerved reticulate-venose; stipules minute, deciduous or 0; axillary inflorescence of *Vateria* (*Zeylania*[8]).

8. **Hopea** Roxb.[9]—Flowers nearly of *Vateria*; receptacle short. Sepals 5, subfree, closely imbricate, unequal; exterior 2 larger in bud. Stamens 10, of which 5 are alternipetalous, larger, and 5 oppositipetalous; or much oftener 15, 3-seriate, of which 10 are alternipetalous; filaments often dilated at base, anthers introrse; connective subulate, cuspidate. Germen of *Vateria*; style more or less dilated at base, apex shortly terete or subulate. Fruit indehiscent; 2 lobes of fructiferous calyx accrescent, wing-shaped, closely connivent round base of pericarp. Seed ovoid; embryo exalbuminous, cotyledons thick-fleshy, unequal, sometimes inclosing superior radicle.—

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[1] Thw. in *Hook Journ.*, vi. 67, t. 2.

[2] Ending in setæ.

[3] Turcz., in *Bull. Mosc.* (1859), i. 262.

[4] Spec. ad 12. Vahl, *Symb. Bot.*, iii. 67 (*Elæcarpus*).—Wight & Arn., *Prodr.*, i. 83.—Arn., in *Ann. Nat. Hist.*, iii. 155.—Wight, *Ill.*, i. t. 36.—Bl., *Mus. Lugd.-Bat.*, ii. 28.—Thw., *Enum. Pl. Zeyl.*, 37.—Walp., *Ann.*, iv., 336; vii. 380.

[5] In *Hook. Journ.*, vi. 69, t. 2.—B. H., *Gen.*, 194, n. 12.

[6] As in *Vateria* sect. *Stemnoporus*.

[7] From which genus it only differs in 5-androus flowers.

[8] Spec. 3. Thw., *Enum. Pl. Zeyl.*, 39.—Walp., *Ann.*, iv. 334; vii. 381.

[9] *Pl. Corom.*, iii. 9, t. 210.—Poir., *Suppl.*, iii. 57.—Endl., *Gen.*, n. 5396.—H. Bn., in *Payer Fam. Nat.*, 273.—B. H., *Gen.*, 193, n. 9.—*Petalandra* Hassk., *Hort. Bogor.*, 104.—? *Pentacme* A. DC., *Prodr.*, 626.

Resinous, glabrous or tomentose trees; leaves entire coriaceous, thinly penninerved reticulate-venose; stipules small deciduous; inflorescence racemose; flowers in racemose branches 1-seriate, sessile or shortly pedicellate (*Trop. Asia*[1]).

9? **Shorea** Roxb.[2]—Flowers nearly of *Hopea;* stamens 15, or oftener 20–∞; connective beyond cells subulate-cuspidate. Germen of *Hopea;* style entire, 3-denticulate at apex. Fruit indehiscent subcoriaceous; 3 lobes of fructiferous calyx accrescent, wing-shaped, base closely connivent round pericarp. Seeds 1, or rarely 2, ovoid; embryo fleshy; cotyledons thick, unequal, usually enclosing superior radicle.—Resiniferous, glabrous, tomentose, or furfuraceous trees; leaves entire or sinuate, parallel-nerved, often transversely reticulate-venose; axillary and terminal inflorescence (of *Hopea*), bracteate or ebracteate[3] (*Trop. Asia*[4]).

10. **Doona** Thw.[5]—Flowers nearly of *Hopea* (or *Shorea*); sepals obtuse; 3 exterior larger in bud. Stamens 15; anthers oval-oblong; connective beyond cells rather thick subglandular subclavate. Germen of *Hopea;* style subulate, stigmatiferous at apex. Fruit indehiscent, strictly included within base of calyx; 3 exterior sepals much accrescent, wing-shaped beyond pericarp, erect patent obtuse. Seed ovoid; testa thin intruded between folds of embryo; cotyledons of exalbuminous embryo wide, much contortuplicate, enclosing superior radicle.—Resiniferous glabrous trees; leaves entire coriaceous thinly penninerved reticulate-venose; stipules small, deciduous; inflorescence of *Hopea*[6] (*Zeylania*[7]).

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[1] Spec. 8–10. Wight, *Ill.*, i. t. 37.—Korth., *Verh. Nat. Gesch. Bot.*, t. 7.—Bl., *Mus. Lugd.-Bat.*, ii. 34.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 503; *Prodr. Fl. Sum.*, 191, 489.—Thw., *Enum. Pl. Zeyl.*, 36.—Hook. f., in *Trans. Linn. Soc.*, xxiii. 161.—Walp., *Ann.*, iv. 338; vii. 379.

[2] *Pl. Coromand.*, iii. 9, t. 212.—Gærtn. f., *Fruct.*, iii. 47, t. 186.—Endl., *Gen.*, n. 5395.—B. H., *Gen.*, 193, n. 8.—A. DC., *Prodr.*, xvi. 628, n. 10.

[3] Gen. scarcely distinct, except by habit, from *Hopea* (of which perhaps it is better as a section).

[4] Spec. about 15. Roxb., *Pl. Coromand.*, iii. t. 212.—Wight, *Icon.*, t. 27, 364 (*Vatica*).—Bl., *Mus. Lugd.-Bat.*, ii. 32, t. 8.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 503; *Prodr. Fl. Sum.*, 191, 487; *Mus. Lugd.-Bat.*, i. 214.—Thw., *Enum. Pl. Zeyl.*, 36.—Walp., *Ann.*, iv. 337; vii. 379.

[5] In *Hook. Lond. Journ.*, iii. t. 12; iv. 7.—B. H., *Gen.*, 193, n. 10.—A. DC., *Prodr.*, xvi. 626, n. 9.

[6] Gen. scarcely distinguished from *Hopea*, it differs first in embryo, but in *Hopea* the cotyledons are also sometimes somewhat corrugated.

[7] Spec. 7, 8. Thw., *Enum. Pl. Zeyl.*, 34.—Walp., *Ann.*, iv. 333; vii. 380.

II. ANCISTROCLADEÆ.

11. **Ancistrocladus** Wall.—Flowers hermaphrodite; receptacle concave. Sepals 5, subequal or unequal, imbricated. Petals 5, inserted with perigynous sepals, contorted. Stamens 5, or more, usually 10, of which 5 shorter are oppositipetalous; 5 others alternate perigynous; anthers introrse, often finally versatile, muticous or shortly apiculate; cells sometimes unequal, longitudinally rimose. Germen adnate at base to interior of receptacle (thence partly inferior), otherwise free, 1-locular, apex conical or subhemispherical, not hollow fleshy; styles 3, tapering at base, apex thickened stigmatiferous; ovule solitary, lateral or subbasilar, ascending, anatropous, micropyle inferior. Fruit coriaceous, indehiscent, partly inferior and adnate to receptacle, surrounded by much accrescent wing-shaped, often subequal perigynous sepals. Seed ascending subglobose; testa intruded between folds of albumen; albumen copious farinaceous much ruminated; embryo axile straight, radicle cylindrical inferior, apex thickened and straight truncate; cotyledons much wider than long, divaricate truncate at apex.—Scandent glabrous shrubs; twigs often unciferous; leaves alternate entire coriaceous, sometimes sagittate, sessile or petiolate; stipules small caducous, or 0; flowers in ramified cymiferous racemes or close to uncinate secund twigs, caducous (*Trop. Asia, Oceania and Africa*). See p. 214.

III. LOPHIREÆ.

12. **Lophira** Banks.—Flowers regular; receptacle subplane. Sepals 5, afterwards unequal, imbricate. Petals 5, alternating with subhypogynous sepals and inserted with them, equal, contorted or more rarely imbricated. Stamens ∞, inserted with perianth, ∞-seriate; filaments erect, connate at base; anthers linear muticous, 2-locular, introrse; cells equal valved, longitudinally rimose. Germen free long conical, 1-locular; apex shortly 2-fid; lobes acute, apex stigmatiferous subulate, reflexed, finally obliterate. Ovules ∞ (oftener 8–16), sub-4-seriate inserted on central free placenta, ascending, imbricate, antropous; micropyle extrorse inferior. Nut oblong, furnished with base of accrescent calyx; sepals persistent

erect-patent, unequally accrescent, rigid; one larger wing-shaped. Seed usually 1, ascending; embryo fleshy; cotyledons thick subequal; radicle short inferior.—A pyramidal tree; leaves alternate, entire, elongate, usually undulate, thickly parallel penninerved, scarcely reticulated; stipules small caducous; flowers in more or less ramified compound racemes, terminal and axillary (*Trop. Western Africa*). See p. 215.

XXIX. CHLÆNACEÆ.

There is in this small family a genus with diplostemonous androceum, which we will study in the first place. It is the genus

Leptolæna multiflora.

FIG. 226.
Bud, without involucel and calyx ($\frac{4}{1}$).

FIG. 222.
Floriferous branch.

FIG. 227.
Flower, without perianth.

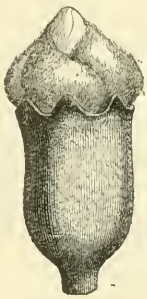

FIG. 223.
Bud ($\frac{5}{1}$).

FIG. 225.
Diagram.

FIG. 224.
Bud, without involucel.

Leptolæna[1] (figs. 222–234), the flowers of which are regular, her-

[1] DUP.-TH., *Hist. des Vég. Rec. dans les Iles Austr. d'Afr.*, 41, t. 11.—DC., *Prodr.*, i. 521.—SPACH, *Suit. à Buffon*, iv. 55.—LINDL., *Veg. Kingd.*, 486, fig. 335.—ENDL., *Gen.*, n. 5399.—

maphrodite, and each enveloped in a more or less fleshy sac, persistent and thickening round the fruit, the opening being cut into five or six teeth. The calyx is formed of three sepals, imbricated or more frequently contorted in præfloration; and the corolla of five petals contorted in the bud. Within the corolla is found a short tube almost membranous, with the upper edge cut straight,

Leptolæna multiflora.

FIG. 229.
Gynæceum.

FIG. 228.
Portion of the disc and of the androecium ($\frac{4}{1}$).

FIG. 230.
Long. sect. of gynæceum.

FIG. 231.
Induviate fruit ($\frac{3}{1}$).

FIG. 233.
Seed ($\frac{4}{1}$).

FIG. 232.
Long. sect. of induviate fruit.

FIG. 234.
Transverse section of seed.

dentate, crenate, generally described as a disc. Within the base ten stamens are inserted, of which five are superposed to the petals, and five alternate rather shorter, each formed of a free filament and a two-celled introrse anther dehiscing by two longitudinal clefts.[1] The gynæceum is free and superior, composed of an ovary with three cells alternate with the sepals, surmounted by a style, the apex

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H. BN., in *Payer Fam. Nat.*, 263.—B. H., *Gen.*, 195, n. 1.

[1] These clefts are most frequently confluent at the summit.

dilated into a very large stigmatiferous irregularly trilobed head.[1] In the internal angle of each cell two collateral descending ovules are inserted, with micropyle looking upwards and outwards. The fruit is dry and indehiscent, surrounded by vestiges of the perianth and

Sarcolæna multiflora.

FIG. 235.
Flower ($\frac{2}{1}$).

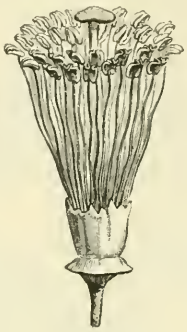

FIG. 237.
Flower without perianth.

FIG. 236.
Long. sect. of flower.

androceum, the whole enveloped by an epicalyx or thickened sac, of which we have spoken before. At maturity it only contains one descendent seed, the coats enclosing a thick albumen, more or less

Schizolæna rosea.

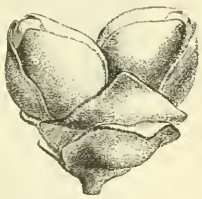

FIG. 238.
Biflorous involucre.

FIG. 239.
Involucre without the flowers.

FIG. 240.
Flower ($\frac{4}{1}$).

fleshy or horny, and in the axis of which is found a superior radicle (fig. 232). *Leptolæna* consists of small shrubs of Madagascar, of which only one or two species are known. The leaves are alternate simple, accompanied by two lateral caducous stipules. The flowers

[1] In reality the style is hollow in the form of an elongated horn; it is traversed in its whole length by three vertical ribs, combinations of the partitions of the ovary, dilating above, and covered with stigmatic papillæ at the summit, which is more or less bent. The three apices are surrounded by a small circular rim, slightly sinuous, encircling them and corresponding to the superior extended edge of the style tube (figs. 229, 230).

united at the summit of the branches or in the axils of the superior leaves in ramified clusters of cymes, generally biparous (fig. 222). There are also three other genera of this family known, natives of the same country and presenting the same general characters as the

Schizolæna rosea.

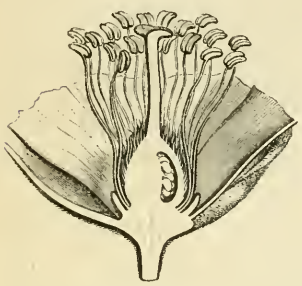

Fig. 241.
Long. sect. of flower ($\frac{6}{1}$).

Fig. 242.
Gynæceum, one cell open ($\frac{7}{1}$).

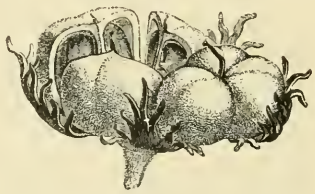

Fig. 243.
Fruit.

preceding. These are: *Sarcolæna* (figs. 235–237), which instead of ten stamens, has an indefinite number, and the fruit of which is capsular with three cells; *Schizolæna* (figs. 238–243), having two flowers in the same involucre, which is accrescent after præfloration, and then incised upon its edges (fig. 241), very numerous stamens, and an indefinite number of ovules in each cell (figs. 241, 242); *Rhodolæna*, the involucre of which, also biflorous, is formed of two very small bracts, the stamens, indefinite in number, are inserted within a short circular disc, and each of the three ovary cells contain in the internal angle four ovules arranged in two ranks.

Thus constituted this small family only contains nine or ten species; it was established in 1806 by Dupetit-Thouars, who alone has studied it much hitherto. We have just added a genus very incompletely known[1] and have besides described a species[2] differing

[1] *Scleroolæna* (H. Bn., in *Adansonia*, x. 234), which certainly belongs to this family, and which cannot be placed in any of the known genera, since we are only acquainted with the fruit. This is surrounded by a woody involucre, smooth without and within, of the form and size of a small egg. It presents a circular opening, the edge of which is furnished with a reflexed fringe formed of penicillate hairs. The fruit proper is very small in reference to the involucel; it is three-celled and polyspermous surmounted by the remains of a style with truncated apex. This genus, therefore, must be allied to those having multiovulate ovary cells, but it differs from all of them inasmuch as its involucre contains but one fruit and also by the singular character of the involucre itself.

[2] In *Adansonia*, x. 177.

from the other in its appearance and foliage, which much resembles that of several of the *Malvaceæ*, particularly the *Hermanniæ*. This only confirms what is known of the close affinity of the *Chlænaceæ* and the *Malvaceæ* with two-celled anthers. Only the stamens of the *Chlænaceæ* are not monadelphous in the same way as those of a large number of *Malvaceæ*. Their filaments are not united among themselves, at the base, in a kind of tube, but are inserted upon the interior surface and close to the base of a circular disc, in the shape of a short vertical cylinder with superior independent edge. *Tiliaceæ* bears a great analogy with *Chlænaceæ*, but the latter has an imbricated calyx like *Ternstræmiaceæ* and *Dipterocarpeæ*, which are also very nearly related. But the *Chlænaceæ* are distinguished from all others by the trimerous type of their imbricated or contorted calyx, by their corolla formed of five or six petals, by their stipules,[1] the nature of their involucre, their disc, their petals, generally contorted,[2] and by the character of their seeds.[3] Scarcely anything is known of the uses of the *Chlænaceæ*, which are all natives of Madagascar. The fleshy involucre of *Sarcolæna grandiflora* (vulg. *Vaa-soui*) has, according to Dupetit-Thouars, the taste of medlars. Rats eat it. *S. multiflora* Dup.-Th. (figs. 235–237), or *Voamassa* of the natives of Madagascar, is, according to Bernier, an aromatic shrub, the leaves of which are chewed as a remedy for toothache.

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[1] In certain *Sarcolænas* they are said to be large, analogous to those of certain Fig-trees (Fr., *Figuiers*). The young leaves, which have their mode of vernation, have often without doubt been taken for them. Their limb frequently presents, as in *Erythroxylon*, fornicate longitudinal lines similar to the nerves of several *Melastomaceæ*, and which are only impressions produced by the edges of the leaves at a certain distance from the midrib of the limb during the period of præfoliation when the foliaceous parenchyma is soft and yielding.

[2] "A tribu *Bonnetiearum* velut a *Dipterocarpeis*, quibus æstivatio eadem, imprimis seminum albumine distinguuntur." (B. H., *Gen.* 194).

[3] We have been able to study completely those of *Scleroolæna Richardi* where they have an oval, cordate form, flat or concave on the side of the hilum which occupies almost the middle of the height of the concave face, and to the plane of which the embryo is parallel, with fornicate cotyledons, digitinerved at the base, interposed to two parallel layers of tolerably solid fleshy albumen. In the other *Chlænaceæ* the general organization of the seed is the same; but especially when numerous, they are more or less deformed by a reciprocal pressure.

GENERA.

1. **Leptolæna** Dup.-Th.—Flowers hermaphrodite; receptacle rather convex. Sepals 3, cortorted or much imbricated. Petals 5, free, contorted. Stamens 10, inserted inside, slightly above the base of urceoliform shortly cylindrical disc, obscurely crenate at apex; filaments otherwise free; 5 oppositipetalous shorter; anthers introrse versatile; connective rather thick; cells 2, longitudinal clefts often confluent at apex. Germen superior, 3-locular; cells oppositipetalous; style elongated stigmatiferous at apex, obtuse 3-lobed, much dilated. Ovules in each cell 2, inserted in internal angle, collaterally descending; micropyle extrorse superior. Fruit dry (indehiscent?) by abortion 1-locular 1-spermous. Seed descending or laterally affixed, subpeltate; micropyle inwardly lateral; testa glabrous coriaceous; albumen fleshy or subcorneous; embryo parallel to hilum; radicle superior cylindrical; cotyledons foliaceous, base digitinerved, subplane or undulate.—Small trees, leaves alternate subentire coriaceous reticulate penninerved; stipules lateral caducous; flowers (small) in racemes (terminal or axillary to upper leaves) much ramified and cymose; each involucel calyciform sacciform suburceolate, 6-denticulate at apex, persistent and accrescent round fruit, rather fleshy, stipitate (*Madagascar*). See p. 228.

2. **Sarcolæna** Dup.-Th.[1]—Flowers nearly of *Leptolæna;* stamens ∞. Capsule 3-locular; cells 1, 2-spermous.—Elegant trees or small trees, sometimes climbing; leaves alternate, usually entire coriaceous, impressed in lines above, from induplicate racemose vernation as if 3–5-nerved or sometimes small submembranous unequal-crenate. Stipules small or oftener wide conical caducous. Inflorescence of *Leptolæna*, many flowered, or sometimes 1 few-flowered terminal,

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[1] *Hist. des Vég. Rec. dans les Iles Austr. d'Afr.*, 37, t. 9, 10.—DC., *Prodr.*, i. 521.—Turp., in *Dict. Sc. Nat.*, Atl., t. 146.—Spach, *Suit. à Buffon*, iv. 54.—Endl., *Gen.*, n. 5598.—H. Bn., in *Payer Fam. Nat.*, 263.—B. H., *Gen.*, 195, n. 1.—*Eriocarpus* J. (ex Dup.-Th.)—*Tantalus* Noronh. (ex Dup.-Th.).

flowers[1] each accompanied by involucel, fleshy urceolate-depressed obscurely and unequally dentate, accrescent fleshy round fruit, exterior glabrous or setose, interior clothed with dense plumose-barbate pulvinate setæ, stipitate (*Madagascar*[2]).

3. **Schizolæna** Dup.-Th.[3]—Flowers nearly of *Sarcolæna;* germen, cells 3, ∞-ovulate. Capsule of *Sarcolæna*, 3-valved.—Small trees; leaves alternate entire coriaceous; stipules 2-nate, flowers[4] in involucel, pedunculate 2-nate; bracts of involucel 2–∞, at anthesis small crenate, round capsules 1, 2, including, large, coriaceous laciniate[5] (*Madagascar*[6]).

4? **Rhodolæna** Dup.-Th.[7]—Flowers nearly of *Sarcolæna;* 5, 6-merous; stamens ∞, inserted in short urceolate tube; anthers versatile. Germen 3-locular; ovules in each cell few.[8] Fruit . . .?—An elegant scandent shrub; leaves alternate rather long petiolate, entire coriaceous[9]; flowers[10] elongate pedunculate;[11] 2-nate, bracts 2 small squamiform[12] stipitate below calyx[13] (*Madagascar*[14]).

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[1] Whitish or pale yellow, sometimes pink (?).

[2] Spec. 4. Dup.-Th., *loc. cit.*—H. Bn. in *Adansonia*, x. 177.

[3] *Hist. Végét. Afr.*, 43, t. 12.—DC., *Prodr.*, i. 521.—Spach, *Suit. à Buffon*, iv. 56.—Endl., *Gen.*, n. 5400.—H. Bn., *in Payer Fam. Nat.*, 263.—B. H., *Gen.*, 195, n. 3.

[4] Ordinary, whitish or pink.

[5] Sometimes sprinkled with a yellowish resinous dust. Outside the bracts of the involucre often occur bracteoles 2–∞, 2-seriate vertical, the more inferior the smaller, 2-cussate imbricate (figs. 238, 239).

[6] Spec. 3. Dup.-Th., *loc. cit.*

[7] *Hist. Végét. Afr.*, 47, t. 13.—DC., *Prodr.*, i. 522.—Spach, *Suit. à Buffon*, iv. 57.—Endl., *Gen.*, n. 5401.—H. Bn., in *Payer Fam. Nat.*, 264.—B. H., *Gen.*, 195, n. 4.—*Pandora* Noronh. (ex Dup.-Th.).

[8] In flowers observed 4, vertical 2-seriate.

[9] "Exstipulate," not lineate.

[10] Slightly thickened at apex.

[11] Pink, "large handsome."

[12] With sepals sprinkled with a yellowish resinous dust.

[13] "Sepala exteriora?" (B. H.)

[14] Spec. 1. *R. altivola* Dup.-Th., *loc. cit.*, "fructu ignoto quoad affinit. dub., forte *Ternstræmiaceis* propinquior, sed stam. urceolo recedit." (B. H.)

XXX. TERNSTRŒMIACEÆ.

I. TEA SERIES (Fr., *Thés*).

The flowers of the Teas[1] (figs. 244–253) are hermaphrodite and regular. The receptacle, slightly convex, bears first five imbricated

Thea chinensis.

Fig. 247.
Long. sect. of flower.

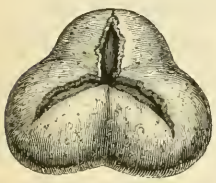

Fig. 248.
Dehiscent fruit.

Fig. 245.
Flower.

Fig. 244.
Floriferous branch.

Fig. 249.
Seed.

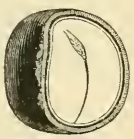

Fig. 250.
Long. sect. of seed.

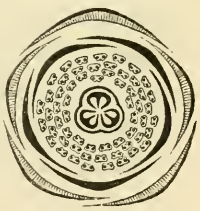

Fig. 246.
Diagram.

sepals, or more rarely a larger number, and five petals alternate with the sepals, or pretty often from six to eight, sessile, concave, all

[1] *Thea* L., *Gen.*, n. 668.—Lettsom, *Mon. Thea.* Lond. (1772).—J., *Gen.*, 262.—Gærtn., *Fruct.*, ii. 83, t. 95.—Poir., *Dict.*, vii., 612; Suppl., v. 294; *Ill.*, t. 474.—DC., *Prodr.*, i. 530.—Turp., in *Dict. Sc. Nat.*, Atl., t. 153.—Spach, *Suit. à Buffon*, iv. 90.—Cambess., in *Mém. Mus.*, xvi. 415.—Endl., *Gen.*, n. 5426.—Chois., *Mém. sur les Fam. des Ternstr. et Camell.*

imbricated in præfloration. The androceum is formed of an indefinite number of stamens, the filaments adhering to the base of the corolla[1] and united among themselves for a short variable distance below, or almost entirely free, especially in the most interior stamens, the anthers of which first extrorse, then versatile, have a thick connective, oval or almost cordiform, bearing on the edges two narrow cells, each dehiscing by a longitudinal cleft.[2] The gynæceum is superior, free, composed of an ovary generally three-celled, surmounted by a hollow style, divided at a variable part of its height into three tubular branches, the summit furnished with a small surface of stigmatiferous tissue. In the internal angle of each ovary cell (superposed when they are three in number, to the sepals 1, 2, 3) there is a placenta generally supporting four ovules, incompletely anatropous,[3] more or less descendent, and arranged in pairs in such a way that the two ovules of each pair turn back to back, and look at each other by their short raphe (fig. 252). The fruit long, green, and fleshy, becomes at length a loculicidal capsule (fig. 248) with three or a smaller number of cells each containing one or two seeds. These enclose under their thick coats[4] a large fleshy oily embryo, the plano-convex cotyledons of which completely surround the gemmule.

Thea chinensis.

FIG. 251.
Gynæceum ($\frac{4}{1}$).

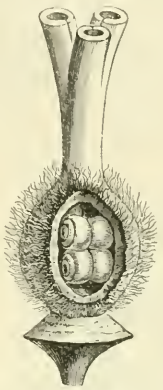

FIG. 252.
Gynæceum, one cell open.

In certain Teas the petals and the stamens are united into a tube for a greater distance. The ovary cells are three or four in number,

(in *Soc. Phys. de Gen.*, xiv. 149).—PAYER, *Organog.*, 532, t. 149.—B. H., *Gen.*, 187.—H. BN., in *Payer Fam. Nat.*, 265.—SEEM., in *Trans. Linn. Soc.*, xxii. 347 (incl.: *Calpandria* BL., *Camellia* L., *Cordyloblaste* HENSCH. (?), *Sassangua* NEES).—*Tsia* KÆMPF., *Amœn.*, 606.—ADANS., *Fam. des Pl.*, ii. 450.

[1] This adherence is very slight or almost nil in the five stamens more anterior than the others and superposed to the petals; or in five groups of several stamens, the number of which is variable, each keeping the same place.

[2] The pollen grains are ovoid with three folds, and in water they become spherical with three bands, and bear three papillæ. (H. MOHL., in *Ann. Sc. Nat.*, sér. 2, iii. 333.)

[3] They have two coats.

[4] The exterior is hard, crustaceous, brown or blackish. It often has faces due to the reciprocal pressure of the different neighbouring grains. Within is found another coat, much softer, sometimes almost suberose, traversed by five fibro-vascular ramified bundles.

the styles remain free in almost the whole of their height and the ovules are five or six in number in each cell, more or less distinctly descendent. In certain others, the corolla of which are often of large dimensions and rich colouring (fig. 253), there is often, but not constantly, an interior stamen, free, or nearly so in front of each petal; this distinguishes *Camellia*,[1] generally considered as constituting a separate genus, but which only ought to form a section of the genus Tea. Thus considered, this genus contains some dozen species,[2] frutescent or arborescent, natives of tropical Eastern Asia, and of the Indian Archipelago. The leaves are alternate persistent, simple, dentate, coriaceous or membranous. The petiole is exstipulate and usually articulated at the base. The flowers occupying the axils of the leaves, especially of the upper ones, are solitary or united in small cymes, the pedicels bearing one or several bracts smaller than the sepals to which they are analogous.

Thea (*Camellia*) *japonica*.

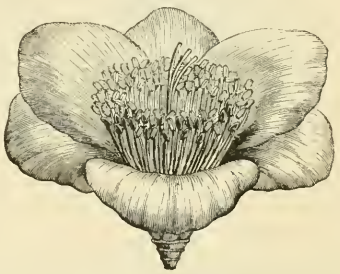

Fig. 253.
Flower.

Beside *Thea* are placed the nearly-allied genera of *Gordonia* (figs. 254, 255) and *Laplacea*. The former has an indefinite number of ovules in each cell, a generally elongated capsule, and seeds prolonged above into a membranous wing. The stamens may be united below into a circular cushion, and the single style dilates in its upper part into a stigmatiferous head with short radiated lobes.

In *Laplacea*, on the contrary, the perianth and the androceum remain the same; the styles, from five to ten in number, are free to the base, or the stigmatic tissue may directly crown each of the ovary cells.

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[1] L., *Gen.*, n. 848.—J., *Gen.*, 262.—Lamk., *Dict.*, i. 572; Suppl., ii. 48; *Ill.*, t. 504.—Cav., *Diss.*, vi. 305.—Cambess., in *Mém. Mus.*, xvi. 415.—DC., *Prodr.*, i. 529.—Turp., in *Dict. des Sc. Nat.*, Atl., t. 152.—Spach, *Suit. à Buffon*, iv. 84.—Endl., *Gen.*, n. 5425.—Chois., in *Mém. Gen.*, 146.—Seem., in *Trans. Linn. Soc.*, xxii. 337.—B. H., *Gen.*, 187, n. 24.—H. Bn., in *Payer Fam. Nat.*, 265.—*Tsubaki* Kæmpf., *Amœn.*, 851.—Adans., *Fam. des Pl.*, ii. 399.—*Sassangua* Nees, in *Sieb. Nippon*, ii. 13.—*Calpandria*, Bl., *Bijdr.*, 178.—Korth., *Verh. Nat. Gesch. Bot.*, 148, t. 31.—? *Cordyloblaste* Hensch., in *Bot. Zeit.* (1848), 604.

[2] Duham., *Arbr.*, ed nov. t. 71.—Jacq., *Ic. Rar.*, t. 553.—Siéb. & Zucc., *Fl. Jap.*, t. 82, 83.—Wall., *Pl. As. Rar.*, iii. t. 256.—Korth., in *Verh. Nat. Gesch. Bot.*, 149 (*Calpandria*).—Seem., *Voy. Her. Bot.*, t. 76–78.—Andr., *Bot. Repos.*, t. 25.—*Bot. Reg.*, t. 537, 942, 1078.—*Bot. Mag.*, t. 42, 2080, 2784, 4976, 5044, 5152.—Walp., *Ann.*, ii. 178; iv. 351; vii. 367 (*Camellia*), 373.

Stuartia (figs. 256–260) is also very analogous to the preceding genera as to the perianth and androceum. But each of the

Gordonia Lasianthus.

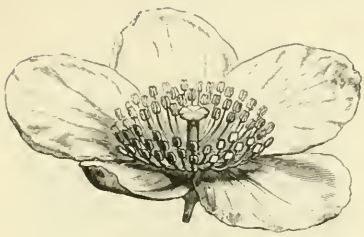

FIG. 254.
Flower ($\frac{2}{1}$).

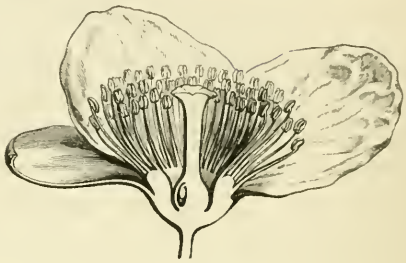

FIG. 255.
Long. sect. of flower.

ovary cells encloses only two ascendent ovules. The fruit is a locu-

Stuartia virginica.

FIG. 256.
Floriferous branch.

licidal capsule, with lenticular seeds, the straight embryo being

surrounded by a fleshy, not very thick albumen, and directing its radicle downwards. *Schima*, allied at once to *Stuartia* and *Gordonia*,

Stuartia virginica.

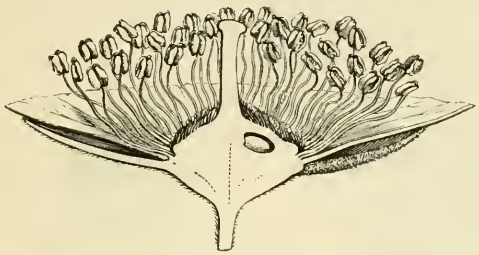

FIG. 257.
Long. sect. of flower ($\frac{2}{1}$).

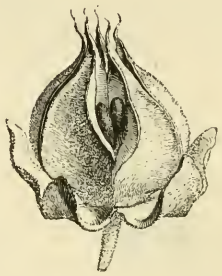

FIG. 258.
Dehiscent fruit.

has not very numerous ascendent and flattened seeds, bordered by a circular wing, with thin albumen, often reduced to a membrane, and an embryo with insymmetrical cotyledons, and incurved and accumbent radicle. *Pyrenaria*, with the same flower, or nearly so, has an indehiscent drupaceous fruit, with few seeds, the embryo thick and fleshy, having an inflexed radicle and conduplicate or folded and crumpled cotyledons.[1]

Stuartia virginica.

FIG. 259.
Seed ($\frac{8}{1}$).

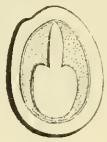

FIG. 260.
Long. sect. of seed.

II. TERNSTRŒMIA SERIES.

Several species of the genus *Ternstrœmia*[2] are seen flowering in our greenhouses, especially *T. brevipes* (figs. 261–263), an American

[1] After these genera, in the same group *Microsemma* has been doubtfully placed, having polygamous, apetalous flowers, a fornicate gland within the base of the sepals, an indefinite number of stamens, and a variable number of cells in the ovary and the fruit. This latter is a capsule analogous to that of a great many of the *Ternstrœmiaceæ*, and each cell contains a descendent seed with superior and exterior micropyle (see *Genera*, p. 264).

[2] MUT., ex L. F., *Suppl.*, 39.—J., *Gen.*, 362.—POIR., *Dict.*, vii. 596; Suppl., v. 289; *Ill.*, t. 456.—DC., in *Mém. Soc. Phys. de Gen.*, i. 408, t. 1; *Prodr.*, i. 523.—CAMBESS., in *Mém. Mus.*, xvi. 403.—TURP., in *Dict. Sc. Nat.*, Atl., t. 151.—SPACH, *Suit. à Buffon*, iv. 61.—ENDL., *Gen.*, n. 5409.—PAYER, *Organog.*, 532.—CHOIS., in *Mém. Gen.*, xiv. 101.—B. H., *Gen.*, 182, n. 8.—H. BN., in *Payer Fam. Nat.*, 265.—LEM. et DCNE., *Tr. Gen.*, 337, 338.—*Taonabo* AUBL.,

species, the flowers of which have a short convex receptacle, supporting five sepals, imbricated in the bud, and five superposed petals, scarcely united at their bases, and also arranged in imbricated præfloration. The androceum is formed of an indefinite number of hypogynous stamens, the filaments also united for a very short

Ternstræmia brevipes.

Fig. 261.
Flower.

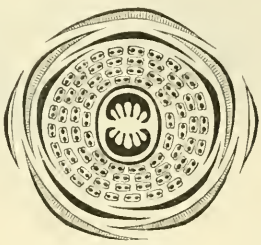

Fig. 262.
Diagram.

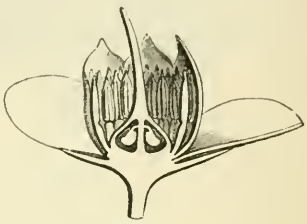

Fig. 263.
Long. sect. of flower.

distance with the base of the corolla and surmounted by basifixed anthers, with two adnate cells, almost marginal, dehiscing by two longitudinal[1] clefts and crowned by a pointed prolongation of the connective. The gynæceum is superior, formed of an ovary with two cells, tapering above into a conical style, with apex almost undivided, and stigmatiferous. In the internal angle of each cell descending from the upper part a wide short placenta is inserted, the inferior edge supporting from five to eight suspended anatropous[2] ovules, with micropyle looking upwards and inwards. The fruit is dry, accompanied at its base by the persistent calyx, apiculate and indehiscent; it encloses a small number of seeds elongated and folded upon themselves, like a horseshoe. Under their coats is found a fleshy embryo, also hippocrepiform, with cylindrical radicle longer than the cotyledons, and surrounded by a fleshy albumen, often thin, or even reduced to a simple membrane.

Guian., 569, t. 227, 228.—*Tonabea* J., *Gen.*, 252.—*Dupinia* Neck., *Elem.*, n. 1042.—*Amphania* Banks, mss. (ex Endl.).—*Cleyera* Thunb., *Fl. Jap.*, 12 (nec DC.).—*Reinwardtia* Korth., *Verh. Nat. Gesch. Bot.*, 101, t. 12 (nec Bl.).—Walp., *Rep.*, v. 129 (incl.: *Erythrochiton* Griff., *Valeckeria* Kl. & Karst.).

[1] The pollen of *Ternstræmia* is formed of ovoid grains analogous to those of the *Teas*. (H. Mohl., in *Ann. Sc. Nat.*, ser. 2, iii. 333). It is the same in the other genera (*Visnea*, *Caraipa*) where it has been studied.

[2] They have two coats. When their anatropy is completed they begin to bend in the inferior portion of their raphe, so that the region of the chalaza is reflexed upon it outwards and upwards. We have noted (in *Adansonia*, x. 238) that this is the first degree of the false campylotropy that we have seen so noticeable in the *Gyrostemoneæ* (page 42, note 6), and which appears also in some other groups.

In other species of the same genus, the petals are more or less clearly alternate with the sepals; in others the flowers are polygamous dicœcious;[1] the style and its stigmatiferous divisions are very variable as to form and dimensions;[2] the number of the ovary cells is three or four, and they are bi- or tri-ovulate; the pericarp is sometimes thin and almost membranous, and sometimes thick and suberous.[3] But in all the known species, some twenty[4] in number, the stem is arborescent or frutescent; the leaves alternate, persistent, entire or dentate, coriacous, exstipulate. The flowers are axillary, pedunculate, solitary or disposed in cymes; and their calyx is accompanied by two or three bracts resembling the sepals, but smaller. Three parts of the known species are natives of tropical America; the rest of the warmest parts of Asia and the Indian Archipelago.

Beside *Ternstrœmia* are placed the nearly allied genera *Adinandra*, *Eroteum*, and *Eurya*, only separated from them in an entirely artificial manner: the first, because its seeds are small and numerous instead of being large and few in number; the second, because in its small flowers, often polygamous or dicœcious, with petals free or scarcely united at the base, the ovules, indefinite in number, are inserted towards the middle of the internal angle of the ovary cells; the third, because its dicœcious flowers have generally an oligandrous androceum.

Visnea Mocanera.

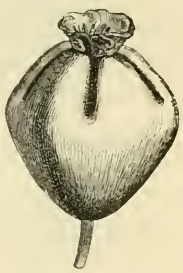

FIG. 264.
Induviate fruit ($\frac{2}{1}$).

In the two genera *Visnea* and *Anneslea*, the general organization is the same; but we make of them a small subseries (*Visneæ*), because their floral receptacle, instead of being convex, becomes more or less concave; the insertion of the perianth and the andro-

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[1] This is found especially in *T. penangiana* CHOIS., which has been made the type of the genus *Erythrochiton* (GRIFF., *Notul.*, iv. 565; —CHOIS., in *Mém. Gen.*, xiv. 126, nec MART.).

[2] The divisions are very large in *Erythrochiton*, and radiating in *Reinwardtia*.

[3] It is divided into six cavities in *Vœlckeria* (KL. & KARST., ex ENDL., *Gen.*, Suppl., iv. 66; —CHOIS., *loc. cit.*, 125); but the ovary being three-celled, they are supposed here to be only half-cells, doubtless separated by false partitions.

[4] SW., *Fl. Ind. Occ.*, ii. 929.—RUIZ & PAV., *Prodr.*, t. 21.—H. B. K., *Nov. Gen. et Spec.*, v. 207, t. 463.—A. S. H., *Fl. Bras. Mer.*, i. 231.—MORIC., *Pl. Nouv. Amér.*, t. 12, 13.—A. RICH., *Fl. Cub.*, t. 27.—WIGHT, *Icon.*, t. 47 (*Cleyera*).—SIEB. & ZUCC., *Fl. Jap.*, t. 80.—MIQ., *Fl. Ind.-Bat.*, i. p. ii. 470.—GRISEB., *Fl. Brit. W.-Ind.*, 103; *Cat. Pl. Cub.*, 35.—TURCZ., *in Bull. Mosc.* (1858), i. 241; (1863), i. 577.—SEEM., *Voy. Her., Bot.*, 87.—A. GRAY, *Amer. Expl. Exp., Bot.*, i. 209.—TR. & PL., in *Ann. Sc. Nat.*, ser. 4, xviii. 258.—WALP., *Rep.*, i. 368; ii. 804; v. 130; *Ann.*, iv. 341; vii. 361.

ceum is consequently perigynous. The receptacle is accrescent round the fruit, becoming fleshy, and is found surmounted by the persistent divisions of the perianth. In *Visnea* (fig. 264), the calyx also becomes fleshy, and surrounds the fruit, without adhering to it; the lower portion only is inserted in the accrescent receptacle, which is thick and quite coriaceous, and surmounted by the persistent imbricated calyx.

III. SAURAUJA SERIES.

Saurauja spectabilis.

FIG. 265.
Inflorescence.

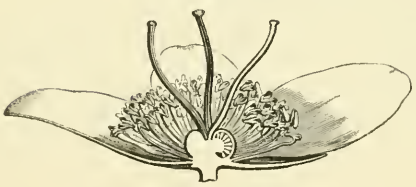

FIG. 266.
Longitudinal section of flower ($\frac{2}{1}$).

The flowers of *Saurauja*[1] (figs. 265, 266) are hermaphrodite or polygamous and regular. Their slightly convex receptacle bears, first, five unequal sepals, often petaloid, arranged in the bud in quincuncial præfloration. The petals, the same in number and alternate, free or united at the base into a corolla which falls in one single piece, are also imbricated in the bud. The stamens are very numerous, usually united for a short distance between themselves and with the base of the corolla. The filaments, in other respects free, support a 2-celled anther, introrse, then versatile, dehiscing above by short clefts or pores. The gynæceum is superior; it is composed of an ovary with five alternipetalous cells, sur-

[1] W., in *Der. Ges. Naturstr. Berl. n. Scr.*, iii. (1801), 406, t. 4.—DC., *Prodr.*, i. 525.—CAMBESS., in *Mém. Mus.*, xvi. 498. — SPACH, *Suit. à Buffon*, iv. 67.—ENDL., *Gen.*, n. 5414.—CHOIS., in *Mém. Gen.*, xiv. 113.—B. H., *Gen.*, 184, n. 15.—H. BN., in *Payer Fam. Nat.*, 267. —*Palava* R. & PAV., *Prodr.* (1794), 100, t. 22 (nec CAV.) — *Marumia* REINW., *Syll. Pl. Ratisb.*, ii. 10.—*Reinwardtia* NEES., *Syll. Pl. Ratisb.*, i. 196 (nec SPRENG., nec DUH., nec KORTH.).—*Apatelia* DC., *Mém. Ternstr.*, 34, t. 8.—DELESS., *Ic. Sel.*, iii. t. 26.—*Blumia* SPRENG., *Syst.*, iii. 126.—*Davya* MOÇ. & SESS., *Fl. Mex. ined.* (ex DC.).—*Leucothea* MOÇ. & SESS., *loc. cit.*—*Vanalphimia* LESCH., mss. (ex ENDL.)—*Obelanthera* TURCZ., *in Bull. Mosc.* (1847), i. 147; (1858), i. 245. DYER, in *Fl. Ind.*, ii. 286.

mounted by a style more or less deeply[1] divided into five branches, stigmatiferous at the apex, and often reflexed when their length permits. They are sometimes very short, and immediately terminated by a papillose surface. In the internal angle of each cell a large placenta is seen, descending or attached by a kind of short foot inserted at the middle of its height; all its dorsal surface is covered with small anatropous ovules,[2] directed in various ways. The fruit is a berry, sometimes almost dry at maturity; it encloses numerous seeds, lodged in the pulp, and which under their coats present a fleshy albumen surrounding a straight or fornicate embryo, with cotyledons generally short. In certain *Saurauias*, which have been generally distinguished under the name of *Scapha*,[3] the two lateral cells of the ovary disappear; and there only remains three superposed to the sepals, 1, 2, and 3, and the style has only three stigmatiferous divisions. This genus includes some sixty species,[4] although a much larger number have been described. These are trees or shrubs, generally covered with rough, sometimes scaly hairs. They have alternate simple leaves, often dentate like a saw, with numerous secondary parallel nerves. The flowers are axillary or lateral, generally white or pink, sometimes slightly odoriferous, often rather large and beautiful, which makes them valued among us for cultivation. They are collected in simple or ramified clusters of cymes, in which each pedicel bears at some distance from the flower two or several bractlets. The genus exists in the warmest regions of Asia, Oceania, and America.

IV. BONNETIA SERIES.

Bonnetia[5] (fig. 267) has regular hermaphrodite flowers. The convex receptacle bears five imbricated sepals, and five alternate petals, longer, and contorted in the bud. The gynæceum is formed of a

[1] It is a little so in *Draytonia* (A. Gray, *Amer. Exped., Bot.*, i. 206, t. 15), of which it has been proposed to make a distinct genus.

[2] The youngest being the superior.

[3] Chois., *in Mém. Gen.*, xiv. 118.

[4] Deless., *Ic. Sel.*, iii. t. 25.—DC., *Mém. Ternstr.*, t. 2-7.—Wall., *Pl. As. Rar.*, iii. t. 148, 178.—Hook., *Icon.*, t. 331, 341.—H. B. K., *Nov. Gen. et Spec.*, vii. t. 648-650 (*Palava*).—Benn., *Pl. Jav. Rar.*, t. 36, 37.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 478; Suppl., i. 480. — Korth., *Verh. Nat. Gesch. Bot.*, t. 19.—Hook. f., in *Trans. Linn. Soc.*, xviii., 159.—Seem., *Voy. Her., Bot.*, t. 16; *Fl. Vit.*, 14.—Tr. & Pl., *in Ann. Sc. Nat.*, sér. 4, xvii. 265.—*Bot. Mag.*, t. 3982.—Walp., *Rep.*, i. 370; ii. 801; v. 131; *Ann.* i., 120; iv. 349; vii. 364.

[5] Mart. & Zucc., *Nov. Gen. et Spec.*, i. 114, t. 100 (nec Schreb.).—Nees & Mart., in *Nov. Acta. Nat. Cur.*, xii. t. 6.—Cambess., in *Mém. Mus.*, xvi. 409.—Endl., *Gen.*, n. 5417.—Chois., in *Mém. Gen.*, xiv. 159.—B. H., *Gen.*, 187, n. 26.—*Kieseria* Nees, in *Nouw. Reis.*, i. 104; in *Flora* (1821), 298.

considerable number of stamens, only united quite at their base into a very short ring, with filaments in other respects free, and two-celled anthers, at first introrse, versatile, inserted at the summit of the filament by a slightly glandular extremity dehiscing by two longitudinal clefts. The gynæceum is superior, formed of an ovary with two, three, more rarely four cells, of which two are lateral, surmounted by a style with capitate or trifid stigmatiferous extremity. In the internal angle of each cell a large placenta is seen, bearing an indefinite number of ascendent, imbricated ovules, arranged in numerous series. The fruit is a capsule, septicidal in its upper part, with columella nil or short, and a large number of linear seeds, the coats of which enclose a straight exalbuminous embryo. *Bonnetia* consists of trees of South America. Four or five species[1] of them are known. The leaves are glabrous, subsessile, alternate, with edges involute in vernation. The flowers are disposed in the axil of the superior leaves, upon a peduncle which bears a single flower, or three, forming a cyme, or a larger number, each placed in the axil of a bract, sometimes caducous, sometimes persistent, or even developed into a kind of involucre.

Bonnetia anceps.

FIG. 267.
Longitudinal section of flower.

Beside *Bonnetia* are placed *Kielmeyera* and *Archytæa*, distinguished from them: the former by its more elongated anthers and descendent ovules, arranged in two vertical series, flattened into the commencement of a wing in the lower part, where they are imbricated among themselves; the latter, by its stamens united into five very distinct bundles, and by its capsule dehiscing from below upwards.

Caraipa has also the same flowers, with stamens, the anther of which is introrse, short, and surmounted by a gland, often concave at the apex, and three ovary cells, each containing two descendent ovules, more rarely three or four, with exterior and superior micropyle.

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[1] A. S. H., *Fl. Bras. Mer.*, i. 301.—TURCZ., in *Bull. Mosc.* (1858), i. 246.—BENTH., in *Journ. Linn. Soc.*, v. 61.—WALP., *Rep.*, i. 373; ii. 801; *Ann.*, vii. 375.

The fruit has an endocarp, separating at maturity from the exterior layers of the pericarp. *Mahurea*, with the same perianth, has elongated anthers, almost basifixed, glanduliferous at the apex, and numerous, linear imbricated ovules, disposed in numerous series. The leaves are alternate, while those of *Haploclathra* are opposite or nearly so, with the same flowers, except that the ovary cells contain but one ascendent ovule. The leaves are also said to be opposite in *Pœciloneuron*, which has only two biovulate cells. In *Marila*, a very nearly allied genus, although it has sometimes been ascribed to another family, the leaves are opposite, as in *Pœciloneuron* and *Haploclathra;* but the tetramerous or pentamerous flowers, disposed in axillary racemes, have petals imbricated and not contorted, as in the preceding genera. The stamens are short, and have their introrse anthers surmounted by a two-lobed gland. The capsular fruit is narrow, elongated, and septicidal, and the seeds which it contains are prolonged into a fringe at the two extremities.

V. PELLICERIA SERIES.

Pelliceria[1] (fig. 268) has regular hermaphrodite flowers. The short receptacle bears five small free imbricated sepals, and five petals, much longer, imbricated and caducous. The androceum is formed of five alternipetalous stamens. Each of them has a free hypogynous filament, and an elongated anther, with a narrow elongated connective, without the base of which the filament is inserted; the anther has two linear cells adnate to the edges of the connective, longitudinally dehiscent. The stamens, nearly of the same length as the style, are each lodged in a longitudinal groove, the surface being hollow.[2] The gynæceum is superior: it is composed of a sessile, articulate ovary, tapering above into a long conical style, the apex bearing two small stigmatiferous teeth, scarcely distinct. The ovary is hollowed into two cells;[3] but they are very unequal: one of them, much narrower, remaining sterile;[4] and the

[1] Tr. & Pl., in *Ann. Sc. Nat.*, ser. 4, xvii. 380. — *Pelliciera* B. H., *Gen.*, 186, n. 21. Placed by the last of these authors in the tribe *Gordonieæ*.

[2] In dry specimens we have seen the anthers detached from these grooves for a variable distance in their upper part.

[3] There should be five, of which four abort early in the plant of New Grenada, according to Triana.

[4] According to Bentham and Hooker it should enclose a sessile ovule aborting early.

other, containing a single ovule, partly campylotropal, attached to the base of a large conical funicle hanging from the summit of the cell, and turning its micropyle upwards and inwards. The fruit is said to be dry, ovoid, turbinate, acuminate, traversed by ten longitudinal grooves, with coriaceous, fungous, indehiscent pericarp. It contains a seed, the coats[1] covering a fleshy embryo, with superior radicle, straight and short, and large, thick, fleshy[2] cotyledons. The only known species of this genus, *P. Rhizophoræ*,[3] is a tree growing in the marshes near the sea, at the extreme north-west of South America, and which has the appearance of the Mangrove. All its organs are glabrous; its leaves alternate, nearly sessile, involuted in vernation, are unsymmetrical at the base, glabrous, and coriaceous. The edges, when young, are furnished with very small, prominent, triangular,[4] caducous teeth. The flowers[5] are solitary and terminal,[6] and each of them enveloped in the bud by two large membranous involute bracts.

Pelliceria Rhizophoræ.

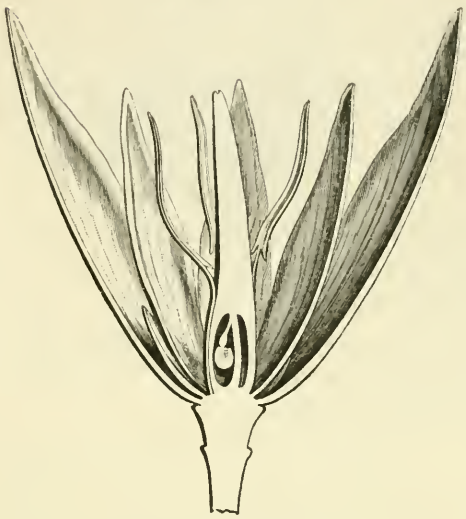

Fig. 268.
Longitudinal section of flower.

VI. MARCGRAVIA SERIES.

The flowers of *Marcgravia*[7] (figs. 269–277) are hermaphrodite and regular. The receptacle, in the form of a depressed cone, bears first a

[1] "Testa fere evanida." (B. H.)

[2] "Plumula longe evoluta."

[3] Pl. & Tr., *loc. cit.* These authors distinguish two forms which should perhaps be two species, distinguished from each other by the colour of the flower and the number of ovary cells.

[4] Implanted on the limb by the summit of the small triangle which they represent.

[5] White or pink.

[6] They are described as placed in the axil of the upper leaves. It seems to us that the short thick peduncle supporting the flower is the extremity of the branch, and that the pointed shoot upon the side is not terminal, but placed in the axil of the leaf preceding the flower.

[7] Plum., *Gen.*, 7, t. 29.—L., *Gen.*, n. 610.—Adans., *Fam. des Pl.*, ii. 408.—P. Br., *Jam.*, 244, t. 26.—Burm., *Amer.*, 166, t. 173.—J., *Gen.*, 244; in *Ann. Mus.*, xiv. 402.—Desr., in

short calyx with four sepals, imbricated and slightly united at their base.[1] Higher is inserted a thick coriaceous gamopetalous corolla detached circularly by its base at anthesis, and falling in like a sort

Marcgravia umbellata.

Fig. 269.
Bud ($\frac{2}{1}$).

Fig. 270.
Diagram.

Fig. 271.
Longitudinal section of flower.

Fig. 272.
Flower without the perianth.

Fig. 274.
Fruit.

Fig. 275.
Fruit open crosswise.

Fig. 273.
Gynæceum.

Fig. 276.
Seed ($\frac{5}{1}$).

Fig. 277.
Longitudinal section of seed.

of cone, dome, or cap. In its upper part alone from two to four small unequally imbricated teeth are seen, but sometimes with great difficulty, representing the free summits of the petals. The stamens are inserted immediately above the corolla, with which they have no adherence. They are each formed of a filament united, at the base only, with the neighbouring filaments in most of the species, and of a two-celled introrse anther dehiscing by two longitudinal clefts.

Lamk. Dict., iii. 710 ; Suppl., iii. 589.—Lamk., *Ill.*, t. 447.—DC., *Prodr.*, i. 565.—Turp., in *Dict. Sc. Nat.*, Atl., t. 154.—Spach, *Suit. à Buffon*, vi. 123.—Endl., *Gen.*, n. 5461.—B. H., *Gen.*, 181, n. 3.—H. Bn., in *Payer Fam. Nat.*, 265.—Lem. & Dcne., *Tr. Gén.*, 333.

[1] Two of them are lateral, and enveloped by the posterior and the anterior. This latter may perhaps also represent the axile bract of the flower raised to its receptacle upon the pedicel; in that way the calyx would only be composed of three leaflets.

Their number is very variable in the different species, sometimes there are only from six to nine,[1] elsewhere from ten to fifteen, but most usually they are much more numerous, and indefinite. The gynæceum is free and superior; it is formed of a sessile ovary, frequently ovoid with the upper extremity surmounted by a small cone of stigmatic tissue, entire or grooved by longitudinal fluting but little apparent. The ovary is divided into a number of complete or incomplete cells, varying from four to eight or ten; and in the internal angle of each cell a placenta[2] is seen, divided into several ramified plates bearing small ovules incompletely anatropal, transverse or ascendent, and indefinite in number. The fruit is globular or nearly so, with suberous fleshy thick pericarp, indehiscent or loculicidal towards the base. It encloses numerous elongated seeds, containing under their coats, which are reticulated without, a fleshy embryo with cotyledons often shorter than the radicle. *Marcgravia* consists of shrubs of tropical America, almost always climbing or epiphytal. They have two kinds of branches; some sterile bearing distichous sessile leaves often provided with two glands, but slightly prominent towards the base of the limb which adheres by its inferior face to the neighbouring objects; others, free and floriferous, are provided with leaves of different forms, alternate, entire, thick coriaceous, and exstipulate.[3] The inflorescence is in terminal racemes. The principal axis bears a variable number of flowers (collected together almost in umbels) pedicellate,[4] often inserted obliquely at the summit of the pedicel, and provided, quite against the flower, with two lateral bractlets similar to the sepals. It is prolonged above and bears a

Norantea guianensis.

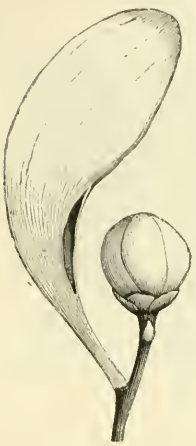

Fig. 278.
Bud and its raised axile bract ($\frac{2}{1}$).

[1] Especially in the *M. oligandra* Griseb. (*Cat. Pl. Cub.*, 39), a species of the Antilles, where the stamens, when they are eight in number, for example, are arranged symmetrically with reference to the antero-posterior plane of the flower. When the stamens are numerous they appear sometimes all disposed on the same verticil; elsewhere there are several anterior to the other, and the flattened filaments being partly covered by those of the latter. The true symmetry of the androceum is unknown to us.

[2] Which is prolonged above into a short channel representing the style, and forms there a sort of pointed radiating crest.

[3] Articulated at the base.

[4] The base of the pedicel is articulated. If there is no bract at the level of this articulation in the fertile pedicels, it is perhaps as we have indicated above, that it is elevated to the flower, or figures as the anterior sepal.

small number of pedicels, terminated by a flower which is but little developed, sometimes even quite aborted. In the length of the exterior edge of these pedicels an adnate bract is seen in the form of a narrow elongated sac, claviform or hood-shaped, or like a reversed

Ruyschia corallina.

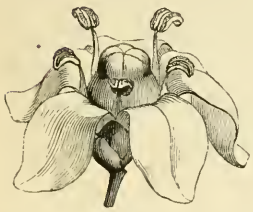

FIG. 280.
Flower ($\frac{2}{1}$).

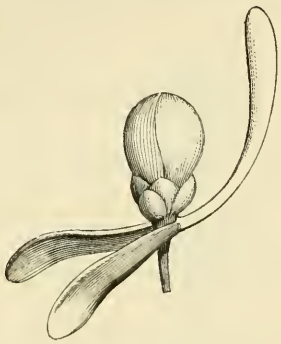

FIG. 279.
Bud and its axile bract.

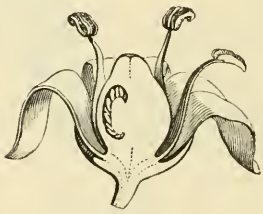

FIG. 281.
Longitudinal section of flower.

urn, with hollow spur, the bottom turning upwards, pointed or obtuse, the narrow opening near the base of the pedicel looking downwards and outwards, and the interior surface secreting a sweet or bitter[1] nectar. From twelve to fifteen species[2] of *Marcgravia* have been described.

Beside this genus is placed *Norantea* (fig. 278) which, with the same organs of vegetation and alternate leaves, have flowers all fertile arranged in racemes or spikes, and all accompanied by an axile sacciform bract raised more or less with the pedicel, but not united with it by its limb, the opening being first turned outward and downward.[3] The sexual organs are nearly those of *Marcgravia*, but the verticils of the perianth are pentamerous, and the petals are

[1] Among all the interpretations proposed for this sort of ascidia, the only one admissible for us appears to be that described by TRIANA and PLANCHON in their *Prodromus*, or in a special work, "*Sur les bractées des Marcgraviées*," inserted in volume ix. of *Mém. de la Soc. Imp. des Sc. Nat. de Cherbourg*, and where the bract, adnate to the sterile pedicel by the upper face of its midrib, will have suffered a deformation so that the upper face, extremely arched above, would represent the convex surface, and its inferior face the secreting cavity of the ascidium, and its edges those of the opening turned downwards and outwards.

[2] L., *Spec.*, ii. 562.—JACQ., *Amer.*, 156, t. 96.—K., *Synops.*, iv. 234.—HOOK., *Exot. Fl.*, t. 160.—GRISEB., *Fl. Brit. W.-Ind.*, 110; *Cat. Pl. Cub.*, 39.—TR. & PL., in *Ann. Sc. Nat.*, sér. 4, xvii. 360.—WALP., *Rep.*, i. 399; ii. 811; v. 146; *Ann.*, i. 129; vii., 360.

[3] It is only then that the bract becomes more or less ascendent (as in fig. 278), and that the opening of the sac which it represents, first exterior and inferior, becomes interior and superior.

quite free, or at least separate from each other to spread out at anthesis to a variable distance in their upper part. *Ruyschia* (figs. 279–281) is also a neighbouring genus, and has the foliage and the inflorescence of *Norantea*, with the axile bracts, often 3-lobed, with inferior concavity always raised upon the axillary pedicel even to the insertion of the flower, which has generally a defined isostemonous androceum.

VII? CARYOCAR SERIES.

Caryocar[1] (figs. 282–287), long considered as forming a distinct family, has beautiful flowers, hermaphrodite and regular, of the pentamerous type, or more rarely tetramerous or hexamerous. Upon their slightly convex receptacle a gamosepalous calyx is inserted, with

Caryocar (*Saouari*) *glabrum*.

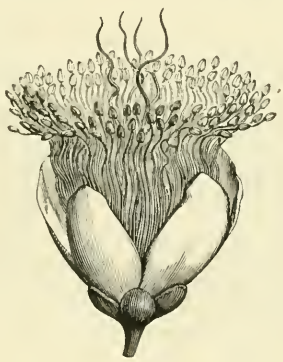

Fig. 283.
Flower.

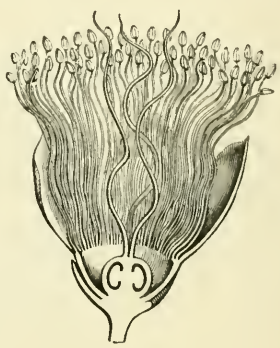

Fig. 284.
Longitudinal section of flower.

deep imbricated divisions, and a corolla the petals of which, alternate and much larger than the sepals, are also imbricated in the bud, and sometimes united, for a very short distance from their base, with that of the androceum. This is formed of a considerable number of stamens united below into a thick, short tube, after which the fila-

[1] Allam., ex L., *Mantiss.* (1767), n. 1314.—J., *Gen.*, 435.—Lamk., *Dict.*, i. 640.—DC., *Prodr.*, i. 599.—Endl., *Gen.*, n. 5642.—B. H., *Gen.*, 180, n. 1.—H. Bn., in *Payer Fam. Nat.*, 268.—*Pekea* Aubl., *Guian.* (1775), ii. 594, t. 238, 239.—Poir., *Dict.*, v. 146; Suppl., iv. 343; *Ill.*, t. 486.—*Saouari* Aubl., *op. cit.*, 599, t. 240.—*Rhizobolus* Gærtn., *Fruct.*, ii. (1791), 93, t. 98.—Corr., in *Ann. Mus.*, v. 394, t. 5.—*Acanthocaryx* Arrudo do Camara, *Disc.* (ex Endl.).

ments, folded and contorted in the bud (fig. 282), become free, and exserted, each supporting[1] a two-celled, introrse anther, dehiscing by two longitudinal clefts. The gynæceum is free, superior, formed of an ovary generally quadrilocular,[2] surmounted by four styles, long and thin, the tapering extremity being stigmatiferous. In the internal angle of each cell a descendent incompletely anatropal ovule is inserted,[3] with the micropyle directed upwards and outwards. The fruit is a drupe, the more or less fleshy mesocarp (fig. 285) enveloping some stones, four in number, generally thick and solid,[4] smooth or rugose without, sometimes covered with prickles or sharp, rigid hairs, penetrating the softer layer which surround them, and round which is often found a layer of a resinous or butyrous substance. Each stone contains a seed, enclosing under its thin and glabrous coats a large fleshy, oily, macropodal embryo, almost the whole mass of which is constituted by an enormous, swollen radicle with superior apex, while the tigella folded on the radicle and surmounted by two small incumbent cotyledons only occupies a very minute portion of the internal and inferior angle of the seed. Seven or eight species[5] of *Caryocar* are

Caryocar (*Saouari*) *glabrum.*

FIG. 282.
Bud, perianth taken away.

FIG. 285.
Fruit.

Caryocar butyrosum (*Pekea*).

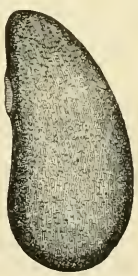

FIG. 286.
Seed.

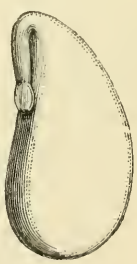

FIG. 287.
Embryo.

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[1] The most interior are said to be sometimes short and antherless.

[2] There are sometimes three, five, or six cells.

[3] It is often attached to the placenta at the middle of the height of its internal angle, and often even lower, its hilum being very near the region of the chalaza, so that it resembles the almost orthotropal arrangement of that of *Anthodiscus.*

[4] When there are several they are unsymmetrical, their internal angle being cut straight, or slightly concave, and representing a kind of linear cicatrice, by which it is applied against the central columella.

[5] CAV., *Icon.*, 37, t. 361, 362.—MUT., ap. CAV., *loc. cit.*, 38.—CAMBESS., in *A. S. H. Fl. Bras. Mer.*, i. 522, 67 *bis.*—HOOK., in *Bot. Mag.*, t. 2727, 2728.—WALP., *Rep.*, i. 419; v. 358; *Ann.*, ii. 207.

known. They are trees, sometimes very high, natives of tropical America. The leaves are opposite, compound-digitate, with three[1] or five thick folioles, often coriaceous, generally dentate or crenate. The petiole is sometimes furnished at the base with two caducous stipules. The flowers, generally large, purple or greenish, are arranged in terminal racemes.

Beside *Caryocar* are placed *Anthodiscus*,[2] consisting of trees or shrubs of the same region, which are only distinguished from them by their alternate trifoliate leaves; by their corollas, which are detached in a single piece at the base, like those of *Marcgravia;* by their stamens plainly grouped in five alternipetalous[3] phalanges, by the numerous cells of their ovary,[4] their almost orthotropal[5] ovules, their coriaceous pericarp, and their embryo with rolled or spiral radicle. Three species[6] of *Anthodiscus* are known.

The family *Ternstrœmiaceæ* was distinguished in 1813 by B. Mirbel.[7] Before him A. L. de Jussieu[8] made the known plants of this group a special section of the Order Citrus (Fr., *Orangers*), characterized by its dry polyspermous fruits. It comprised, with *Ternstrœmia* (and *Tonabea*, wrongly preserved as distinct), *Thea* and *Camellia*, of which Mirbel also made a separate family under the name of *Theaceæ*.[9] De Candolle adopted this method of arrangement, preserved as distinct the Order of *Ternstrœmiaceæ*,[10] and that of *Theaceæ*, which he named *Camellieæ*.[11] In 1828, Cambessèdes, in a special memoir,[12] which was long considered as an authority

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[1] Character of the section *Saouari*, while the species of the section *Pekea* have five.

[2] C. F. Mey., *Prim. Fl. Essequeb.*, 193.—Lindl., *Veg. Kingd.*, 398, fig. 280.—Endl., *Gen.*, n. 5643.—B. H., *Gen.*, 181, n. 2.—H. Bn., in *Payer Fam. Nat.*, 268.

[3] They are all united below in a short annular enclosure; then a bundle is detached opposite each of the teeth of the calyx, the middle filaments of which are much longer and inflexed in the bud; they then diminish in size until they meet the edges of the neighbouring bundles, and they are straight with erect anthers

[4] This is surrounded at the base by a short unequal disc. The cells vary from eight to twenty.

[5] In *A. peruanus* the micropyle is superior, and the hilum is close to the base a little nearer the internal than the external edge. In other terms, the anatropal movement is scarcely indicated, and the ovule becomes ascendent.

[6] Benth., in *Trans. Linn. Soc.*, xviii. 236, t. 20.—H. Bn., in *Adansonia*, x. 241.

[7] In *Bull. Soc. Philom.*, 381 (*Ternstrœmiaceæ*).

[8] *Gen.* (1789), 262.

[9] *Loc. cit.*, 381.

[10] In *Mém. Soc. Gen.*, i. (1823), 393; *Prodr.*, i. (1824), 523, Ord. 30.—Lindl., *Veg. Kingd.*, 396, Ord. 142.—Endl., *Gen.*, 1017, Ord. 215.

[11] *Théor. Elém.* (1813); *Prodr.*, i. 529, Ord. 31.

[12] *Mém. sur les Fam. des Ternstrœmiacées et des Guttifères* (in *Mém. Mus.*, xvi. 370).

upon this question, united the two groups into one and the same family of *Ternstrœmiaceæ*, the history and the general organization of which he made known. The genera before established which he admitted[1] were thirteen in number:—*Cochlospermum*, *Ternstrœmia*, *Eroteum* (*Freziera*, *Cleyera*), *Eurya*, *Saurauja*, *Stewartia*, *Gordonia*, *Architæa*, *Mahurea*, *Marila*, *Kielmeyera*, *Caraipa*, *Thea*; he added *Laplacea* and *Bonnetia*, but he left there wrongly one of the *Bixaceæ*—*Ventenatia*.[2] In 1855, Choisy, continuing the study of this family in a detailed monograph,[3] found there as newly-established genera,[4] *Adinandra*, Jack;[5] *Anneslea*, Wallich;[6] *Pyrenaria*, Blume,[7] and *Schima*, Reinwardt.[8] He admitted besides the genus *Pentaphylax*, Champion, which has been finally rejected. Bentham and J. Hooker, in their *Genera*,[9] comprise in this family *Rhizoboleæ*, that is to say, the genera *Caryocar* and *Anthodiscus*;[10] *Marcgraviæ*, with the three old genera, *Marcgravia*, *Norantea*, and *Ruyschia*; *Actinidia* and *Stachyurus*, genera belonging to other groups,[11] and which they united in the same tribe with *Saurauja*; the *Omphalocarpum* of Palisot de Beauvois, which is one of the African *Sapotaceæ*; the *Microsemma* of Labillardière, whose place among the *Ternstrœmiaceæ* has also been contested;[12] also *Pelliceria*, whose existence in Columbia[13] Triana had just indicated, and *Haploclathra*, detached by Bentham[14] from the ancient genus *Caraipa*. In 1865, Beddome[15] added *Pœciloneuron* to the preceding genera; which, besides the doubtful types,[16] makes the number of genera which we can preserve as autonomous twenty-eight.

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[1] Only counting those which we have preserved as distinct.

[2] He did not include *Visnea* (*Mocanera*) which Jussieu (*Gen.*, 318) had placed, we know not why, among the *Onagraceæ*.

[3] *Mém. sur les Fam. des Ternstrœmiacées et Camelliacées* (in *Mém. Soc. Phys. et Hist. Nat. de Gen.*, xiv. 94).

[4] Without citing those which had not been kept as autonomous.

[5] In *Comp. to Bot. Mag.*, i. (1835).

[6] *Pl. As. Rar.*, i. (1830).

[7] *Bijdr.*, 1119 (1826).

[8] In *Bl. Bijdr.*, 129 (1825).

[9] I. (1862-1867), 177, 981, Ord. 28.

[10] G. F. Mey., *Prim. Fl. Essequeb.* (1818).

[11] The former has been studied among the *Dilleniaceæ* (vol. i. 114, 134); the latter was formally placed among the *Pittosporeæ* (Endl., *Gen.*, n. 5699), and appeared nearly allied to certain *Ericaceæ*.

[12] Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 359.

[13] Ex B. H., *Gen.*, 186 (1862); in *Ann. Sc. Nat.*, *loc. cit.*, 380 (1863).

[14] In *Journ. Linn. Soc.*, v. (1861).

[15] In *Journ. Linn. Soc.*, viii. (1864).

[16] These are: 1. *Michoxia* Velloz. (*Fl. Flum.*, v. t. 103), ascribed doubtfully by Bentham & Hooker (*Gen.* 438) to the genus *Ternstrœmia*, but finally rejected from this genus by the same authors on account of its 2-fid calyx and its cucullate nectary. 2. *Hexadica* Lour. (*Fl. Coch.*, 562), which Mueller d'Argovie ascribes (in DC., *Prodr.*, xv. p. ii. 1259) to *Ternstrœmiaceæ*, or to *Clusiaceæ*; an opinion which Bentham & Hooker find inadmissible. 3. *Catostemma* Benth. (in *Hook. Lond. Journ.*, ii. 365; ii. 365). In this tree of British Guiana, which was first ascribed to the abnormal *Ternstrœmiaceæ*, then to equally abnormal genera of *Myrtaceæ*, the flowers are hermaphrodite and

We group them in seven series, of the distinctive characters of which we must first give a summary.

I. Theæ.—Corolla polypetalous or more or less gamopetalous, imbricated. Stamens with anthers often extrorse, then versatile. Fruit indehiscent or loculicidal. Seeds exalbuminous or with thin albumen, rarely abundant, with straight or curved embryo, cotyledons oval, smooth, corrugated or folded, and short radicle straight or inflexed.—Trees or erect shrubs, with uniflorous peduncles often very short.—(7 genera.)

II. Ternstrœmieæ.—Corolla imbricated. Stamens with anthers basifixed or nearly so. Fruit rarely dehiscent. Seed with fleshy albumen often but little abundant, with embryo inflexed or in the shape of a horseshoe, and narrow cotyledons, nearly as large as the radicle, and shorter.—Trees or erect shrubs, with uniflorous peduncle. —(6 genera.)

III. Saurauieæ.—Corolla imbricated. Anthers versatile. Fruit often fleshy, pulpous within, very rarely dehiscent. Seeds small and numerous, with abundant albumen, and embryo straight or rarely fornicate, with semicylindrical cotyledons, shorter than the radicle. —Trees or shrubs, most generally covered with rough or scaly hairs. Flowers generally numerous, disposed in ramified racemose cymes. —(1 genus.)

IV. Bonnetiæ.—Corolla generally contorted.[1] Stamens with versatile almost basifixed anthers. Fruit capsular, septicidal. Seeds with albumen, but little abundant or wanting, and straight embryo with large thick cotyledons and a short radicle.—Trees or erect shrubs. Flowers disposed in axillary or more generally terminal ramified racemes of cymes.—(8 genera.)

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regular, with a receptacle in the form of a deep sac, the glandular throat of which gives insertion to a valvate calyx unequally cloven in anthesis, and five imbricated petals afterwards reflexed like the sepals, and an indefinite number of stamens, free, or nearly so, with confluent two-celled anthers. At the bottom of the purse-like receptacle, but without any adherence with its walls, is inserted a three-celled ovary, surmounted by a slender trifid style, with three divisions, stigmatiferous at the apex. In the internal angle of each cell, quite at the bottom, are inserted two collateral ascendent ovules, with micropyle directed downwards and inwards. The fruit is unknown. The leaves are alternate, simple, and stipulate, with obovate-oblong limb retuse, coriaceous, not punctuate, with numerous secondary parallel prominent nerves. The flowers are solitary, or few in number in the axils of the leaves; the pedicel bears two bracteoles at a certain height. The only known species is *C. fragrans*, Benth. By the structure of the receptacle it appears allied to a certain point with the *Rosaceæ*, with united carpels in a single plurilocular ovary; but its other characters are such as will not allow us to place it in this family any more than in those to which it has already been ascribed.

[1] Except here and there in *Mahurea*, and almost constantly in *Marila*, where it is distinctly imbricated.

V. Pelliceriæ.—Flowers enveloped in two large bracts with imbricated corolla and calyx. Androceum isostemonous; ovary of which only one cell is fertile and uniovulate.—Trees with alternate unsymmetrical leaves and solitary subsessile terminal flowers.—(1 genus.)

VI. Marcgraviæ.—Corolla imbricate, with the parts free or united below for a great distance in a sort of cap which is detached at the base. Stamens definite or indefinite in number. Anthers subbasifixed. Fruit with thick pericarp, indehiscent or rarely partly dehiscent. Seeds small and numerous, exalbuminous; embryo fleshy, straight or lightly fornicate, with cotyledons shorter than the radicle. Epiphytal or sarmentose shrubs with terminal inflorescence in short racemes or umbels, with 1-flowered bracts often transformed into ascidia, &c.—(3 genera.)

VII. Caryocareæ.[1]—Corolla imbricate, with petals free or adhering and falling together as a cap. Ovary cells uniovulate. Fruit indehiscent. Seed exalbuminous, macropodal, with much-developed radicle, inflexed or spirally rolled.—Trees or shrubs with compound digitate leaves and flowers disposed in terminal racemes.—(2 genera.)

In *Ternstrœmiaceæ*, as in all families formed "by concatenation," there are few characters which are absolute, and those of one series pass easily to those of another. The features of organization, which vary but little in a natural group, and suffice even to distinguish one family from another, are not constant in a given series. Thus from one genus to another we see the corolla gamopetalous or polypetalous, the stamens definite or indefinite in number, hypogynous or perigynous, the fruit dry or fleshy, the seeds with or without albumen, the leaves alternate or opposite stipulate exstipulate.[2] Hence arises a great difficulty in separating distinctly *Ternstrœmiaceæ* from the numerous neighbouring groups with which it presents affinities. According to all authors it is very nearly allied to *Tiliaceæ*, and in general very badly distinguished from it except in the præfloration of the calyx, which is always imbricated in *Ternstrœmiaceæ* and generally valvate in *Tiliaceæ*.[3] *Dipterocarpaceæ*, which differ distinctly from the latter by the very decided imbrication of the sepals, become thus

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[1] *Rhizoboleæ* DC., *Prodr.*, i. 599.—Endl., *Gen.*, 1075, Ord. 231.—*Rhizobolaceæ* Lindl., *Veg. Kingd.*, 398, Ord. 143.

[2] When these organs exist in *Ternstrœmiaceæ* they are always but very slightly developed.

[3] We know, however, that the imbrication of the calyx is very decided in certain species of *Sloanea*, generally inseparably from those with valvate calyx (on the value of this character see *Adansonia*, x. 190).

more closely allied to the *Ternstræmiaceæ*. Besides, these latter have some genera (all the *Bonnetieæ* except *Marila*) where the corolla is contorted as in *Dipterocarpaceæ*. But in this case the fruit is capsular, polyspermous, and the habit is different as well as the foliage, and it is very rarely that the calyx is accrescent round the fruit of the *Ternstræmiaceæ;* it never forms round or above it one or several large membranous or ligneous wings. But we should not really deceive ourselves as to the value of these latter differential characters.[1] We ought to say as much of the character presented by the indusium of *Chlænaceæ*. These (which might possibly be admitted as a series in this family) are always distinguished by the three following points:—within the sac of the indusium traces of the true calyx are always found; the pieces are smaller in number than those of the corolla; the stamens are inserted within a tube of variable length, which in the monadelphous *Ternstræmiaceæ* is formed by the base of the staminal filaments themselves.[2] We shall see subsequently that the *Ternstræmiaceæ* with opposite leaves are very difficult to separate by absolute characters from *Hypericaceæ* and *Clusiaceæ*, with which they have usually been considered as very nearly allied, and that they also present incontestable affinities, although more distant with some *Sapotaceæ* and *Ericaceæ*. By *Actinidia*, extremely analogous to *Saurauja*, they approach *Dilleniaceæ* by *Dillenieæ* series; and there are some *Ochnaceæ* of the *Luxemburgia* series which ranged sometimes among the *Ternstræmiaceæ*, may be confounded with them by their habit, their foliage, and their inflorescence, so that we should not be able to distinguish them without having recourse to the observation of their tolerably developed stipules, to their more or less oblique ovary, and to the characters presented by the insertion of the style, the organization of the anthers, and the direction of the ovules. Let us conclude, that the limits of this family are extremely artificial.

The *Ternstræmiaceæ* are about two hundred and sixty-eight[3] in number. They are scarcely ever found farther north than the Asiatic

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[1] Certain *Dipterocarpaceæ*, like *Pachynocarpus*, have the fruit destitute of wings, and the calyx is accrescent after anthesis in *Visnea* and *Anneslea*.

[2] *Chlænaceæ* belongs evidently to a region where there are scarcely any *Ternstræmiaceæ;* there are only one or two species, little known and doubtful, in Madagascar. But it has been asked if *Rhodolæna* is not one of the *Chlænaceæ* (B. H., *Gen.*, 195).

[3] Lindley (*Veg. Kingd.*, 397, Ord. 142) admitted a hundred and thirty in 1846, without, it is true, counting *Marcgraviæ* and *Caryocareæ*, which, according to him, comprised thirty-four species.

provinces, where the Tea plant is cultivated. In America *Stewartia* and *Gordonia* attain nearly the same northern limits as the latter in the Himalayas. In America, as in Oceania, they do not extend farther south than the 30th degree. This family can scarcely be said to be represented in tropical Africa by a few rare species found in the East or in the West. *Visnea* is confined to Madeira and the Canary Isles. In the warm regions of Asia and the Indian Archipelago we meet with the following genera:—*Thea, Anneslea, Adinandra, Eurya, Schima, Pœciloneuron, Pyrenaria, Ternstræmia, Eroteum, Saurauja, Stewartia, Gordonia:* the five last are found in tropical America. A hundred and forty species belong to it, as well as all the *Marcgravieæ*, and *Caryocareæ*, the genera *Laplacea, Bonnetia, Kielmeyera, Haploclathra, Marila*, and *Mahurea*. *Caraipa* and *Archytæa*, almost entirely American, are, however, each represented also by one species, one in tropical Africa, and the other in the Indian Archipelago.

But few species are usefully applied,[1] and by far the most widely spread is the Tea plant. Most botanists agree in regarding as simple forms or varieties of *T. chinensis*[2] (figs. 244–252), *T. viridis*,[3] *Bohea*,[4] *cochinchinensis*,[5] *cantoniensis*,[6] *stricta*,[7] *assamica*,[8] &c.; it is the *Tscha* or *Théh* of the Chinese, and the *Tsja* of the Japanese,[9] an evergreen shrub from 1 to 2 yards high, which, a native of the extreme east of continental and perhaps of insular Asia, has been transported to the Nilgherry mountains, to Malabar,[10] to the south of the United States,[11] to Brazil,[12] &c. As to the numerous commercial kinds of Tea, black or green, they owe their physical

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[1] Endl., *Enchirid.*, 532. — Lindl., *Veg. Kingd.*, 396.—Rosenth., *Syn. Plant. Diaph.*, 737.

[2] Sims., in *Bot. Mag.*, t. 998.—DC., *Prodr.*, i. 530, n. 1.—A. Rich., *Elém.*, éd. 4, ii. 520.—Seem., in *Trans. Linn. Soc.*, xxii. 349.—Guib., *Drog. Simpl.*, éd. 6, iii. 628, fig. 739. Rosenth., *op. cit.*, 738.—Rév., in *Fl. Méd. du* xix^e *siècle*, Atl., iii. t. 43.—Moq., *Bot. Med.*, 163, fig. 51.

[3] L., *Spec.*, 735.— Letts., *Mon.*, t. 1.

[4] L. *Spec.*, 743.—Blackw., *Herb.*, t. 352.—Loisel., *Herb. Amat.*, t. 255.

[5] Lour., *Fl. Cochinch.*, ed. ulyssip. (1790), 338.—DC., *Prodr.*, *loc. cit.*, n. 2 (vulg. *Ché án nâm.*, ex Lour.).

[6] Lour., *op. cit.*, 339 (*Ho nam Cha yong; Che tau*).

[7] Heyn., *Arzn.* (ex Rosenth., *op. cit.*, 739.

[8] Mast. (ex Seem., *loc. cit.*, 349).

[9] On this plant, its use, its preparation, and its properties, see Kæmpf., *Theæ Jap. Hist.* (in *Amœn. Exot.*, 605-631), and the numerous works enumerated in the *Thesaurus* of Pritzel, ed. i. p. 462.

[10] See *Pharm. Journ.*, sér. 2, i. 475.— MacClell., *Rep. on the Phys. Cond. of the Assam Tea Pl.*, Calc. (1838); *Pop. rel. . . . for Introd. the . . . Tea Pl. in Ind.*, Calc. (1839).— Griff., *Rep. on the Tea Pl. of Upp. Ass.*, Calo. (1838).

[11] See *Pharm. Journ.*, *loc. cit.*, 429.

[12] Gullem., *Rapp. . . . sur les Cult. et la Prépar. du Thé . . . . .* Paris (1839).—Guib., *loc. cit.*, 632.

characters and their different properties to the various modes of preparation to which the leaf is often submitted, and doubtless also to the age at which it is gathered.[1] The azotic,[2] aromatic,[3] and astringent principles to which Tea owes its virtues appear to exist only in very small proportions in the other plants of the family.[4] The species of the subgenus *Camellia* are, however, sometimes endowed with a tolerably strong perfume, especially *T. Sasanqua*,[5] a species used in China to aromatize the tea. Its seeds yield an oil contained abundantly in their fleshy embryo, which is employed in the same way as that of *T. drupifera*[6] and *japonica*.[7] This latter, under the name of *Camellia*, is one of the most celebrated ornamental plants.[8] Some other *Ternstræmiaceæ* are astringent, especially the American species of the genus *Gordonia*, *G. pubescens*,[9] and *Lasianthus*[10] (figs. 254, 255), the bark of which is rich in tannin, and is used in dyeing and in the preparation of skins. *Visnea Mocanera*[11] (fig. 264) has

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[1] See GRUNDH., in *Neu. Jarb. d. Pharm.*, xxviii. 201. — GUIB., *loc. cit.*, 629. According to the latter, the principal sorts of green tea, being those which are called in commerce: *Hyson*, *Young Hyson*, *Gunpowder*, and (Fr.) *Chulan*. "*Chulan* is only HYSON artificially aromatized (with *Camellia Sasanqua* and *Mogorium Sambac*, *Olea fragrans*); *Gunpowder* tea is only green tea chopped and rolled. Young Hyson (Fr. *perlé*) only differs from Hyson inasmuch as its leaves are smaller; which can be accounted for by its being gathered at a less advanced age." As to the principal black teas called *Bohea*, *Souchong*, *Pekoe*, which are distinguished by their brown colour, and the almost complete absence of a principle (tannic) having affinity with oxygen, "they might be thought to be the production of a distinct species; but it is possible that their difference may result from the leaves having been treated with water or steam, or submitted to the commencement of fermentation.

[2] Which is theine, similar to caffeine ($C^{10}H^{10}Az^4O^4+H^2O^2$). M. PELIGOT points out another azotic principle analogous to the caseine of milk.

[3] It is a yellowish thick essence, with a very strong odour, "stupefying."

[4] *Eroteum thæoides* SW., (*Prodr.*, 85) is employed in Jamaica as a substitute for tea, so that experimental researches might be made in other species of the same genus, and upon the Japanese and Indian *Eurya*, which might be cultivated in the south of Europe.

[5] *T. oleosa* LOUR., *Fl. Cochinch.* (ed. 1790), 339.—DC., *Prodr.*, i. 530, n. 3.—ROSENTH., *op. cit.*, 739.—*Camellia Sasanqua* THUNB., *Fl. Jap.*, 273, t. 30.—SIMS., in *Bot. Mag.*, t. 2080. —KER, in *Bot. Reg.*, t. 567.—STAUNT., *Amb. Chin.*, ii. 466, ic.—DC., *Prodr.*, i. 529, n. 2.—SEEM., in *Trans. Linn. Soc.*, xxii. 343, 351.—HOOK., in *Bot. Mag.*, t. 5152 (flor. flav.)—*C. oleifera* ABEL., *Chin. Journ.*, 174, ic.—SEEM., in *Bonplandia*, vi. 278. — *Sasanqua* KÆMPF., *Amœn. Exot.*, 853.

[6] *Camellia drupifera* LOUR., *Fl. Cochinch.* (ed. 1790), 411.—DC., *Prodr.*, n. 5.—SEEM., in *Trans. Linn. Soc.*, xxii. 344.—*C. Kissi* WALL., in *As. Res.*, xiii. (ex DC., *Prodr.*, n. 4).—*C. Keimia* HAM. — *C. Chamgota* HAM., (ex CHOIS.).—*C. Mastersiana* GRIFF.—*C. symplocifolia* GRIFF., *Notul.*, t. 604, fig. 2 (ex SEEM.). —*C. oleifera* WALL., *Cat.*, n. 976 (nec ABEL).—*Mesua bracteata* SPRENG., *Syst.*, iii. 127 (ex SEEM.)

[7] L., *Spec.*, 982.—DC., *Prodr.*, i. 529, n. 1.

[8] See COLLA, *Camelliogr.*, Torino (1843). — BAUMANN, *Bolweill. Camell.* (1829–31). — CHANDL., *Camell. Brit.* (1825). — CHANDL. & BOOTH, *Ill. and Descr. Camell.* (1831).—BERLESE, *Icon. du g. Camell.* (1839); *Monogr. du g. Camell.* (1840).—WALP., *Ann.*, vii. 370.

[9] PURSH., *Fl. Bor.-Am.*, 451.—DC., *Prodr.*, i. 528, n. 5.—*Franklinia americana* MARSH, *Arbr.*, 48. — *Lacathea florida* SALISB., *Par. Lond.*, t. 56.

[10] L., *Mantiss.*, 570.—CAV., *Diss.*, t. 161.—DC., *Prodr.*, n. 1.—*Hypericum Lasianthus* L. (vulg. *Loblolly Boy*).

[11] L. FIL., *Suppl.*, 36.—WEBB., *Phyt. Canar.*, t. 69, B.—SCHACHT, in *Bot. Zeit.* (1859), 368; *Zur Kennt. d. Visnea*, Regensb. (1859), ic. —ROSENTH., *op. cit.*, 737. It is especially employed in the treatment of hæmorrhoids.

also an astringent bark and root, as is also *Ternstrœmia japonica*,[1] which is used in the treatment of dysentery in Japan; *Ternstrœmia sylvatica*, or *Yerva del Cura*, in Brazil; *Caraipa angustifolia* Aubl.,[2] in Guiana. Some Brazilian *Kielmeyeras* are employed as being mucilaginous, especially *K. rosea* and *speciosa*.[3] Several Asiatic *Saurauias* are said to have the same quality.[4] In the Antilles, *Marcgravia umbellata*[5] (figs. 269–277) is employed as a diuretic and antisyphilitic. *Caryocar* has been long celebrated for its fleshy edible embryo, rich in oil, especially in the *Saouari* of Guiana or *C. glabrum*[6] (figs. 282–285), in *C. butyrosum*[7] (figs. 286, 287), *tuberculosum*[8] and *nuciferum* of the same country, and in *C. amygdaliferum*[9] of New Grenada. In the anfractuosity of the external surface of their nut, sometimes prolonged into pointed prickles, entering deeply into the skin, a soft substance is found lodged in the mesocarp, sometimes resinous and bitter, medicamental, as in the *C. amygdaliferum*, sometimes butyraceous as in *C. butyrosum*, and employed in Cayenne for the same culinary purposes as butter. The bark of *C. brasiliense*[10] furnishes a black and brown dye.

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[1] Thunb., in *Act. Soc. Linn.*, ii. 335.—*Cleyera japonica* Thunb., *Fl. Jap.*, 224 (see Kæmpf., *Amœn.*, 774, ic.).

[2] *Guian.*, 562, t. 224, fig. 4.

[3] A. S. H., *Pl. Us. Bras.*, t. 58.—Rosenth., *op. cit.*, 738.

[4] Endl., *Enchirid.*, 532.

[5] L., *Spec.*, 503 (part.).—Plum., *Icon.* (nec P. Br., nec Jacq.).

[6] Pers., *Enchirid.*, ii. 84.—DC., *Prodr.*, i. 599, n. 2.—Lindl., *Veg. Kingd.*, 399.—H. Bn., in *Dict. Encycl. Sc. Méd.*, xii. 741.—*Saouari glabra* Aubl., *Guian.*, 599, t. 240.—*Rhizobolus Saouari* Corr., in *Ann. Mus.*, viii. 394, t. 5, fig. 2.

[7] W., *Spec.*, ii. 1243.—DC., *Prodr.*, *loc. cit.*, n. 5.—Endl., *Enchirid.*, 566.—Rosenth., *op. cit.*, 785.—*Pekea butyrosa* Aubl., *op. cit.*, 594, t. 238. Its wood, like that of several others, is used in ship-building.

[8] *C. tomentosum* W., *loc. cit.*, 1244.—*Pekea tuberculosa* Aubl., *loc. cit.*, 397, t. 139.—*Rhizobolus Pekea* Gærtn., *Fruct.*, t. 98, fig. 1. (The specific name of *Pekea* cannot be preserved, having been generically applied to several species.)

[9] Cav., *Icon.*, 37.—*C. Almendron* Mut., in *Cav. Icon.*, t. 361, 362.

[10] Cambess., in *A. S. H. Fl. Bras. Mer.*, i. t. 67 *bis*.

GENERA.

I. THEÆ.

1. **Thea** L.—Flowers hermaphrodite regular; receptacle conical. Sepals 5 or more rarely 6–∞, gradually accrescent from bractlets to petals, much imbricated. Petals 5 or more rarely 6–∞, often shortly connate at base to a greater or less height among themselves and with filaments of exterior stamens, much imbricated. Stamens ∞, the exterior shortly or more rarely long 1-adelphous; 5 or more rarely 10–15 (*Camellia*), free; anthers extrorse, 2-locular, versatile; cells linear, often with rather thick connective acute or acuminate at apex, marginally rimose. Germen 3–5-locular; styles same in number, free nearly at base or oftener connate beyond the middle in a tube, free tubular at apex, stigmatiferous quite at apex. Ovules in each cell 2-seriate inserted in internal angle, anatropous, raphe contiguous, subhorizontal, descending. Capsule subcarneous, finally dry, with loculicidal dehiscence; seeds in cells often solitary or few, thick, sometimes unequally compressed; embryo exalbuminous fleshy, cotyledons thick plano-convex, base sheathed round superior radicle. —Trees or shrubs; leaves alternate (evergreen), coriaceous or membranous, usually serrate; flowers axillary or subterminal, solitary or subcymose, few, pedunculate or subsessile (*Trop. Asia, Ind. Arch.*). See p. 235.

2. **Gordonia** Ell.[1]—Flowers hermaphrodite; perianth[2] nearly of *Theæ*. Stamens ∞; filaments inserted in fleshy annular cupule adnate at base to petals (*Eugordonia*), or more rarely 5-adelphous; phalanges oppositipetalous (*Franklinia*[3]); anthers extrorse, finally versatile. Germen 3–5- or rarely 6-locular; style erect, simple, apex stigmatiferous capitate radiant; ovules in each cell 4–∞, descending. Capsule ligneous, oblong or subglobose (*Franklinia*), with loculicidal dehiscence; columella persistent. Seeds flat or compressed, more

[1] In *Phil. Trans.*, lx. (1770), 518, t. 11.—J., *Gen.*, 275.—Lamk., *Dict.*, ii. 770; Suppl., ii. 816; *Ill.*, t. 594.—DC., *Prodr.*, i. 582.—Spach, *Suit. à Buffon*, iv. 79.—Endl., *Gen.*, n. 5424.—Payer, *Organog.*, 532, t. 149.—A. Gray, *Gen. Ill.*, t. 140–142.—B. H., *Gen.*, 186, n. 22.—H. Bn., in *Payer Fam. Nat.*, 265 (incl.: *Antheischima* Korth., *Carria* Gardn., *Dipterospermum* Griff., *Franklinia* Marsh, *Lacathea* Salisb., *Polyspora* Sweet).

[2] Petals whitish or pink.

[3] Marsh, *Arb.*, 48.—*Lacathea* Salisb., *Par. Lond.*, n. 56.

or less long winged at apex; embryo exalbuminous, nearly straight or oblique; cotyledons ovate or flat (*Polyspora*[1]), sometimes slightly undulate-plicate; radicle superior short.—Trees or shrubs; leaves alternate (evergreen), entire or crenate; flowers pedunculate, solitary, axillary or collected at summit of twigs; bractlets 2–5, inserted on sometimes elongated peduncle (*North America, Trop. Asia, Ind. Arch.*[2]). See p. 237.

3. **Hæmocharis** Salisb.[3]—Flowers hermaphrodite; perianth and androceum of *Gordonia*. Germen 5–10-locular; styles short divergent or stigmate wide sessile distinct; ovules in each cell 4–∞, descending. Capsule thin, or oftener woody oblong loculicidal; columella persistent; seeds ∞, winged at apex; embryo exalbuminous, straight; cotyledons oblong flat; radicle short superior.—Trees or shrubs, glabrous or hirsute; leaves alternate; flowers in upper axils subsessile[4] or subterminal[5] (*Trop. America, Ind. Arch.*[6]).

4. **Steuartia** Catesb.[7]—Flowers 5, 6-merous, nearly of *Theæ* (or *Gordonia*); germen 5-locular; styles 5, distinct (*Malachodendron*[8]) or oftener long connate (*Eusteuartia*); ovules in each cell 2, oblique ascendent. Capsule ligneous-crustaceous, loculicidal; seeds naked

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[1] Sweet, *Hort. Brit.*, 61.—*Carria* Gardn., in *Calc. Journ. of Nat. Hist.*, vii. 7.—*Antheischima* Korth., *Verh. Nat. Gesch. Bot.*, 137, t. 27.—*Dipterospermum* Griff., *Notul.*, ix. 564 (ex B. H.).

[2] Some 20 species, of which 2 are American. Chois., in *Mém. Gen.*, xiv. 138, 140 (*Polyspora*). —A. Gray, *Man.*, ed. 5, 104.—Chapm., *Fl. S. Unit. States*, 60.—Benth., *Fl. Hongk.*, 29.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 489.—Thw., *Enum. Pl. Zeyl.*, 40.—Hook. f., in *Trans. Linn. Soc.*, xxiii. 162.—*Bot. Mag.*, t. 4019 (*Polyspora*).—Walp., *Rep.*, i. 374; ii. 802; *Ann.*, ii. 177; vii. 367.

[3] *Par. Lond.*, n. 56.—Chois., in *Mém. Gen.*, xiv. 142 (where reasons are more fully given for preferring the generic name).—*Laplacea* H. B. K., *Nov. Gen. et Spec.*, v. 207, t. 461.—DC., *Prodr.*, i. 527.—Cambess., in *Mém. Mus.*, xvi. 407, t. 1 A.—Spach, *Suit. à Buffon*, iv. 76.—Endl., *Gen.*, n. 5416.—B. H., *Gen.*, 186, n. 23.—*Wickstrœmia* Schrad., in *Gœtt. Anz.* (1821), 710 (nec Spreng.).—*Lindleya* Nees, in *Flora* (1821), 209 (nec K.).

[4] Handsome or ordinary, recalling *Gordonia*.

[5] "Korthalsius (in *Verh. Nat. Gesch. Bot.*) gen. 2 vindic.: *Laplaceam* H. B. K. (Korth., *loc. cit.*, 136, t. 26), et *Closaschimam* (Korth., *loc. cit.*, 139, t. 28), Choisyus has 2 junxit sub nom. *Laplaceæ*, quam, adjecta tertia spec. asiat. cum quarta cubensi, a *Hæmocharide* Salisb. disting., sed charact. nos effugit. Habitus, calyx, stili, etc., haud differunt." (B. H., *loc. cit.*).

[6] Twelve species, of which nine are American. A. S. H., *Fl. Bras. Mer.*, i. 299.—Mart. & Zucc., *Nov. Gen. et Spec.*, i. 106, t. 66, 67.—Moric., *Pl. Nouv. Amer.*, t. 11.—A. Rich., *Fl. Cub.*, t. 26.—Griseb., in *Mem. Amer. Acad.* (1860), 166; *Fl. Brit. W.-Ind.*, 104.—A. Gray, *Amer. Explor. Exped., Bot.*, 213.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 490; Suppl., i. 482.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 268.—Walp., *Rep.*, i. 372; ii. 801; v. 132; *Ann.*, i. 121; ii. 177; iii. 833; vii. 367 (*Laplacea*).

[7] *Nat. Hist. of Carol.*, etc., iii. 13 (1743).—L., *Gen.*, n. 847 (perp. *Stewartia*).—J., *Gen.*, 292.—Poir., *Dict.*, vii. 340; Suppl., v. 249; *Ill.*, t. 593.—DC., *Prodr.*, i. 528.—Spach, *Suit. à Buffon*, iv. 78.—Cambess., in *Mém. Mus.*, xvi. 406.—Endl., *Gen.*, n. 5423.—Chois., in *Mém. Gen.*, xiv. 136.—*Stuartia* B. H., *Gen.*, 185, n. 17.—H. Bn., in *Payer Fam. Nat.*, 266.

[8] Cav., *Diss.*, v. 302, t. 158.—DC., *Prodr.*, i. 528.—Spach, *Suit. à Buffon*, iv. 77.

or membranous-marginate (*Malachodendron*); albumen usually scanty; embryo straight, cotyledons ovate or elliptical; radicle inferior.—Shrubs; leaves alternate membranous, deciduous; flowers[1] axillary solitary, sessile or shortly pedunculate (*North America, Japan*[2]). See p. 238.

5? **Schima** Reinw.[3]—Flowers nearly of *Gordonia;* outermost petal sometimes much concave or subcucullate. Germen 4, 5-locular; style simple or wide patent stigmatiferous lobed at apex; ovules in each cell 2–8, laterally affixed, descending. Capsule globose, usually depressed ligneous, loculicidal; columella persistent. Seeds flat subreniform, margin (except interior) wide marginate-winged; albumen thin or 0; embryo rather fleshy; cotyledons subfoliaceous, unequal, flat or corrugate at base; radicle inferior incurved accumbent at base.—Trees; leaves alternate perennial; flowers pedunculate, axillary solitary, shortly racemose or subumbellate, few; peduncle 2-bracteolate[4] (*Trop. America, Ind. Archipelago*[5]). See p. 239.

6. **Pyrenaria** Bl.[6]—Flowers of *Schima* (or *Gordonia*); sepals very unequal, gradually accrescent from bractlets to petals, much imbricated. Stamens ∞, all or exterior ones connate; anthers oblong, versatile. Germen 5-locular; styles 5, free or more or less long connate; ovules in each cell 2, incompletely anatropous, ascending. Fruit drupaceous, indehiscent; putamen sometimes thin; seeds[7] oblong thick or unequally compressed; testa hard; cotyledons of exalbuminous embryo corrugate-plicate or conduplicate; radicle inferior inflexed.—Trees; leaves alternate, entire or serrate; flowers shortly pedunculate axillary, oftener nutant; other characters of *Gordonia* (*Ind. Arch., Malaysia*[8]).

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[1] Large or moderate in size, white or pink; stamens sometimes violet, or rather purple.

[2] Spec. 5, of which 2 are N. American. Sm., *Exot. Bot.*, t. 101.—Andr., *Bot. Repos.*, t. 73.—Lher., *Stirp.*, t. 73, 74.—Sieb. & Zucc., *Fl. Jap.*, t. 96.—A. Gray, *Gen. Ill.*, t. 138, 139; *Man.*, ed. 5, 104.—Chapm., *Fl. S. Unit. States*, 61.—*Bot. Mag.*, t. 3918.—Walp., *Rep.*, i. 374.

[3] Ex Bl., *Bijdr.*, 129.—Chois., in *Mém. Gen.*, xiv. 141.—B. H., *Gen.*, 185, n. 18.

[4] Gen. perhaps to be united with *Gordonia*, for it differs only by its inferior radicle, but the form of the fruit seems the same as in the Sect. *Franklinia* of *Gordoniæ*.

[5] Korth., in *Verh. Nat. Gesch. Bot.*, t. 29.—Hook. f., in *Trans. Linn. Soc.*, xxiii. 160 (*Gordonia*).—Miq., *Fl. Ind.-Bat.*, i. p. ii. 491; Suppl., i. 484.—Seem., in *Bonplandia*, vii. 49; *Voy. Her., Bot.*, t. 75.—*Bot. Mag.*, t. 4539 (*Gordonia*).—Walp., *Rep.*, v. 135; *Ann.*, ii. 178; vii. 366.

[6] *Bijdr.*, 1119.—Chois., in *Mém. Gen.*, xiv. 171.—Endl., *Gen.*, n. 5429.—B. H., *Gen.*, 185, n. 19.—*Ensynaxis* Griff., *Notul.*, iv. 560, t. 603.

[7] Exterior nearly of *Thea*, but smaller.

[8] Spec. 6, 7, Korth., in *Verh. Nat. Gesch. Bot.*, t. 30.—Seem., in *Trans. Linn. Soc.*, xxii. 340.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 493.—Walp., *Ann.*, vii. 366.

7? **Microsemma** Labill.[1]—Flowers polygamous-diœcious; receptacle rather convex. Sepals 5 or more rarely 6, thick, dorsally subcostate, much imbricated, persistent; each at base furnished inwardly with a small gland (coloured) fornicate-2-fid. Stamens ∞; filaments free or slightly connate at base, in bud corrugate; anthers slightly introrse; connective rather thick; cells linear curvate, longitudinally rimose. Germen (in male flower rudimentary effete,[2] much setose), 8–12-locular;[3] style short, apex stigmatiferous 5, 6-fid. Ovule in each cell solitary (?), descending from summit of internal angle; micropyle extrorse superior. Capsule surrounded by base of persistent calyx and staminal filaments, 8–12-locular, with loculicidal dehiscence; columella 0. Seeds in cells solitary descending;[4] testa hard; ventral raphe and chalaza[5] prominent below, arillate fleshy; albumen thin fleshy; cotyledons of shorter embryo[6] elliptical-ovate; radicle conical superior.—Erect branching shrubs; leaves alternate oblong coriaceous;[7] petiole articulate at base; flowers umbellate (?) lateral or subterminal[8] (*N. Caledonia*[9]).

II. TERNSTRŒMIEÆ.

8. **Ternstrœmia** L. f.—Flowers hermaphrodite or more rarely polygamous; receptacle shortly convex. Sepals 5, sometimes ciliate-glandular, much imbricated. Petals same in number opposite or more or less alternate, usually conical at base, imbricated. Stamens ∞; filaments often adnate to base of corolla, otherwise free; anthers basifixed apiculate; cells adnate, introrse or lateral rimose. Germen free; cells 2 or more rarely 3, 4, complete; style conical, elongated or very short, apex stigmatiferous, simple or more or less widely 2–4-lobed. Ovules in each cell 2 or more rarely 3–8, inserted on wide placentas at summit of internal angle of cells descendent, anatropous; raphe dorsal, base more or less arched; micropyle introrse

[1] *Sert. Austro-caled.*, 58, t. 57.—Endl., *Gen.*, n. 5415.—B. H., *Gen.*, 187, n. 25.

[2] Cells sometimes distinct.

[3] Perhaps equal in number to stigma cells, but 2-locellate by false dissepiment.

[4] Funicle rather long oblique.

[5] Albumen placed at summit of cupule of obconical chalaza below drawn out in an incurved filament with continuous raphe.

[6] Immature albumen scarcely extending to middle.

[7] Ribs, beneath, and twigs pubescent.

[8] Anomalous gen. to be expelled from the order Tr. & Pl. (in *Ann. Sc. Nat.*, sér. 4, xvii. 539). Gynæceum hitherto imperfectly known.

[9] Spec. 1. M. *salicifolia* Labill., *loc. cit.*

superior. Fruit indehiscent, apiculate, furnished with base of calyx; pericarp thin or more or less spongiose-suberose; seeds ∞, hippocrepiform complicate; albumen fleshy, sometimes thin or 0; embryo arched or reflexed; cotyledons semiterete, shorter than superior radicle.—Trees or evergreen shrubs; leaves alternate simple exstipulate coriaceous, entire or serrate-crenate; flowers axillary solitary pedunculate or cymose 2–∞; bracts under flower 2, 3, analogous to sepals (*Trop. America, Asia, Ind. Arch.*). See p. 239.

9. **Adinandra** Jack.[1] — Flowers nearly of *Ternstræmia;* stamens free or 1–5-adelphous at base; filaments often hirsute. Germen 3–5-locular; style entire or 3–5-fid stigmatiferous at apex; ovules in each cell ∝, crowded, affixed to rather prominent placenta. Fruit indehiscent; seeds ∞, small; embryo albuminous; inflexed cotyledons semiterete, shorter than superior radicle.—Evergreen trees;[2] leaves alternate; flowers[3] axillary pedunculate solitary; peduncle short or recurved, 2-bracteolate at apex (*Trop. Asia, Trop. Africa*[4]).

10. **Eroteum** Sw.[5] — Flowers nearly of *Ternstræmia,* hermaphrodite or polygamous; stamens 15–∞, usually adnate to corolla at base; anthers glabrous or sometimes (*Cleyera*[6]) pilose. Germen 2, 3-locular or more rarely 5-locular (*Lettsomia*[7]); ovules ∞, inserted within at middle of cell or slightly above, descending; style more or less high, sometimes deeply (*Tristylium*[8]) 2–5-fid. Fruit indehiscent; seeds ordinary; albumen fleshy; embryo inflexed; cotyledons semiterete, shorter than radicle.—Trees or shrubs; habit of *Ternstræmia* or *Eurya*; leaves more or less coriaceous glabrous tomentose or setose, sometimes (as in *Chlænacea*) with lines impressed by induplicate-

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[1] In *Hook. Compan. to Bot. Mag.*, i. 153.—Endl., *Gen.*, n. 5428.—Chois., in *Mém. Gen.*, xiv. 111.—B. H., *Gen.*, 182, n. 9.—*Sarosanthera* Korth., in *Verh. Nat. Gesch. Bot.*, 103, t. 16 (ex B. H.).

[2] Habit sometimes of *Ternstræmia,* sometimes of *Gordonia.*

[3] Large, glabrous or silky.

[4] Spec. 10, of which 1 is African. Hook. & Arn., *Voy. Beech., Bot.*, t. 23 (*Cleyera*).—Korth., *loc. cit.*, t. 18,—Miq., *Fl. Ind.-Bat.*, i. p. ii. 476; Suppl., i. 478.—Thw., *Enum. Pl. Zeyl.*, 41 (*Sarosanthera*). — Oliv., *Fl. Trop. Afr.*, i. 170.—Walp., *Rep.*, v. 130 (*Sarosanthera*); *Ann.*, vii. 362.

[5] *Prodr.*, 85 (1788).—*Freziera* Sw., *Fl. Ind. Occ.*, 671, t. 19 (1800).—DC., in *Mem. Gen.*, i. 414; *Prodr.*, i. 524.—Cambess., in *Mém. Mus.*, xvi. 404.—Spach, *Suit. à Buffon,* iv. 63.—Endl., *Gen.*, n. 5412.—Chois., in *Mém. Gen.*, xiv. 120.—B. H., *Gen.*, 183, n. 11.

[6] DC., *Prodr.*, i. 524 (nec Thunb.). — Cambess., in *Mém. Mus.*, xvi. 405. — DC., *Prodr.*, i. 525 (part.).—Endl., *Gen.*, n. 5411. —Chois., in *Mém. Gen.*, xiv. 109.—B. H. *Gen.*, 183, n. 10.—*Hoferia* Scop., *Introd.*, n. 846 (ex Endl., *loc. cit.*).

[7] R. & Pav., *Prodr.*, 77, t. 14.—Chois., in *Mém. Gen.*, xiv. 123.

[8] Turcz., in *Bull. Mosc.* (1858), i. 247.

involute vernation as if 3-nerved; flowers[1] axillary pedunculate solitary or cymose; bractlets 2, often minute or 0[2] (*Warm Asia and America*[3]).

11? **Eurya** Thunb.[4]—Flowers nearly of *Eroteum*, small, dicœcious; stamens ∞ or sometimes small (5–15), adnate to corolla at base; anthers basifixed glabrous. Germen 2–5-locular; styles 2–5, more or less long connate. Other characters of *Eroteum*.—Small shrubs; leaves often serrate-crenate and glabrous; inflorescence of *Eroteum*[5] (*Warm reg. of Asia, Ind. Arch.*[6]).

12. **Visnea** L. fil.[7]—Flowers nearly of *Ternstrœmia*; receptacle shortly cupuliform. Perianth and stamens slightly perigynous (of *Ternstrœmia*). Germen slightly immersed in base of receptacle, 3-locular; styles 3, distinct; ovules in each cell 2, 3, inserted below apex of internal angle, descending; micropyle introrse superior. Fruit indehiscent, immersed and included in base of accrescent fleshy calyx and receptacle; seeds few, 3-quetrous-piriform; albumen fleshy; embryo curved or hippocrepiform; cotyledons semiterete shorter than radicle.—An evergreen tree; leaves alternate articulate exstipulate; flowers[8] in axillary few-flowered cymes (*Canary Isls. and Madeira*[9]).

13. **Anneslea** Wall.[10]—Flowers nearly of *Visnea*; receptacle con-

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[1] Small, more rarely large.

[2] Gen. hence scarcely distinguished from *Ternstrœmia*, thence from *Eurya*.

[3] Spec. 10–12, of which 10–12 are Amer. H.B., *Pl. Æquin.*, t. 5–9 (*Freziera*).—H. B. K., *Nov. Gen. et Spec.*, v. 209 (*Freziera*).—Wight & Arn., *Prodr.*, i. 86 (*Cleyera*).—Hook. & Arn., *Beech. Voy., Bot.*, t. 33 (*Cleyera*).—Tul., in *Ann. Sc. Nat.*, sér. 3, viii. 326.—Griseb., *Fl. Brit. W.-Ind.*, 103 (*Cleyera, Freziera*); *Cat. Pl. Cub.*, 36 (*Cleyera*).—Sieb. & Zucc., *Fl. Jap.*, t. 81 (*Cleyera*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 261 (*Freziera*).—*Bot. Mag.*, t. 4546 (*Freziera*).—Walp., *Rep.*, i. 370; *Ann.*, i. 117; ii. 177; iv. 349 (*Freziera*); vii. 362 (*Cleyera, Freziera*).

[4] *Fl. Jap.*, 11, t. 25.—R. Br., *App. to Abel's Chin.*, 379, ic.—DC., in *Mém. Gen.*, i. 416; *Prodr.*, i. 525.—Cambess., in *Mém. Mus.*, xvi. 405.—Spach, *Suit. à Buffon*, iv. 66.—Endl., *Gen.*, n. 5410.—Chois., in *Mém. Gen.*, xiv. 123.—B. H., *Gen.*, 183, n. 12.—H. Bn., in *Payer Fam. Nat.*, 265.—*Geeria* Bl., *Bijdr.*, 124.

[5] Gen. scarcely distinguished from preceding.

[6] Spec. 10 (described to 35). Wight & Arn., *Prodr.*, i. 86.—Wight, *Ill.*, t. 38.—Lodd., *Bot. Cab.*, t. 1213.—Seem., *Voy. Her., Bot.*, t. 74; *Fl. Vit.*, 14.—Korth., *Verh. Nat. Gesch. Bot.*, t. 17.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 470.—Benth., *Fl. Hongk.*, 27.—A. Gray, *Amer. Explor. Exp., Bot.*, i. 209.—Walp., *Rep.*, i. 369; *Ann.*, iv. 342; vii. 363.

[7] *Suppl.*, 36, 251.—Lamk., *Dict.*, iv. 208.—Endl., *Gen.*, n. 5408.—Payer, *Organog.*, 585, t. 149.—Chois., in *Mém. Gen.*, xiv. 130.—B. H., *Gen.*, 182, 981, n. 7.—H. Bn, *in Payer Fam. Nat.*, 265.—H. Schacht, *Zur Kennt. d.* Visnea Mocanera. Regensb. (1849), c. tab.—*Mocanera* J., *Gen.*, 318.

[8] Small, white.

[9] Spec. 1. *V. Mocanera* L. f., *loc. cit.*—Bory, *Ins. Fort.*, t. 7.—Webb, *Phyt. Canar.*, t. 66 B.—Walp., *Ann.*, vii. 361.

[10] *Pl. As. Rar.*, i. 5, t. 5.—Endl., *Gen.*, n. 5406.—Chois., in *Mém. Gen.*, xiv. 129.—B. H., *Gen.*, 182, n. 6.—H. Bn., in *Payer Fam. Nat.*, 265 (nec Roxb.).

cave, finally in tube adherent to fruit, coriaceous-fleshy, much accrescent. Sepals and petals much imbricated, and ∞ stamens (of *Ternstrœmia*). Germen quite immersed in receptacle, 3-locular; style 3-fid at apex; ovules in each cell 4–∞; seeds ∞, hippocrepiform-complicate; embryo albuminous inflexed; cotyledons semiterete, shorter than radicle.—Trees (evergreen); habit and inflorescence (of *Ternstrœmia*); flowers[1] rather long, pedunculate; other characters of *Ternstrœmia* (*Malaysia, Martaban*[2]).

III. SAURAUJEÆ.

14. **Saurauja** W.—Flowers hermaphrodite or more rarely polygamous; receptacle shortly convex. Sepals 5, unequal, often petaloid, much imbricated. Petals 5, alternate, free or connate at base, much imbricated. Stamens ∞; filaments usually adherent to base of corolla, otherwise free; anthers basifixed, introrse, afterwards versatile; cells dehiscent by pores at apex or by short clefts, sometimes finally elongated. Germen 3–5-locular; styles same in number, free at base or more or less high connate, stigmatiferous at apex, usually reflexed; ovules ∞, anatropous, inserted outwardly on placenta, pendulous or laterally adfixed inwardly to internal angle of cell. Berry 3–5-locular, rarely subdry or subdehiscent; seeds ∞, small, immersed in pulp; albumen more or less copious; embryo straight or curved, cotyledons short. — Trees or shrubs, often strigose-pilose or squamate; leaves alternate, usually serrate; veins parallel crowded with divergent ribs, often articulate at base, exstipulate; flowers axillary or lateral, in racemes simple, or ramified, cymiferous; cymes sometimes 1-parous at apex; bractlets small, remote from calyx (*Tropical America, Asia, and Oceania*). See p. 242.

IV. BONNETIEÆ.

15. **Bonnetia** Mart. & Zucc.— Flowers regular hermaphrodite; receptacle convex. Sepals 5, unequal, imbricated. Petals same in

[1] Large, whitish.

[2] Spec. 2. Miq., *Fl. Ind.-Bat.*, i. p. ii. 488.

number, alternate longer, contorted. Stamens ∞ ; filaments very shortly connate at base in ring, otherwise free; exterior shorter; anthers small in bud, at first introrse and pendulous at summit of filaments, afterwards versatile; connective slightly glandular at insertion of filaments. Germen superior 3, 4-locular, tapering in style entire capitate or 3-fid stigmatiferous at apex; ovules ∞, ∞-seriate in internal angle, ascending, linear. Capsule acuminate or septicidally dehiscing above; columella short or 0; seeds ∞, linear; straight radicle of exalbuminous embryo inferior.—Glabrous trees; leaves alternate evergreen, tapering at base sessile or subsessile; flowers in axil of upper leaves pedunculate; peduncle 1-flowered or usually cymose, 3-flowered, sometimes ∞-flowered; bracts and bractlets sometimes large conspicuous, sepaloid, persistent, sometimes caducous or minute (*Tropical South America*). See p. 243.

16. **Kielmeyera** Mart. & Zucc.[1]—Flowers nearly of *Bonnetia;* anthers subbasilar rather long subversatile; cells linear, introrse. Germen 3–5-locular; style stigmatiferous at apex shortly lobed; ovules ∞, 2-seriate, dehiscing, base subwinged, imbricated downwards. Capsule oblong angulate septicidal; seeds ∞, smooth, expanded in wings below; embryo exalbuminous; cotyledons thick subreniform. —Small trees;[2] leaves (evergreen) alternate, sessile or petiolate; flowers[3] terminal solitary or much oftener in simple or ramified racemes (*Brazil*[4]).

17. **Archytæa** Mart. & Zucc.[5]—Flowers nearly of *Bonnetia;* stamens ∞, high 5-adelphous; anthers small introrse, versatile. Germen 4, 5-locular; ovules ∞, linear, ∞-seriate, imbricated; styles free nearly to base (*Ploiarium*[6]) or at a greater or less height, sometimes connate stigmatiferous at apex. Capsule acuminate, septicidal from base; columella persistent; seeds ∞, linear; embryo scantily albuminous, straight. — Glabrous trees or shrubs; leaves alternate

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[1] *Nov. Gen. et Spec.*, i. 109, t. 68–72.—Cambess., in *Mém. Mus.*, xvi. 412.—Chois., in *Mém. Gen.*, xiv. 161.—Spach, *Suit. à Buffon*, iv. 71.—Endl., *Gen.*, n. 5419.—B. H., *Gen.*, 188, n. 28.—*Martiniera* Velloz., *Fl. Flum.*, v. t. 114 (nec. Guillem.).

[2] Resinous.

[3] Handsome; petals unsymmetrical.

[4] Spec. ad 15. A. S. H., *Pl. Us. Bras.*, t. 58; *Fl. Bras. Mer.*, i. 303, t. 60, 61, 63.—Pohl., *Pl. Bras.*, ii. t. 129–132.—Walp., *Rep.*, i. 373; v. 133.

[5] *Nov. Gen. et Spec.*, i. 116, t. 73. — Cambess., in *Mém. Mus.*, xvi. 410.—Endl., *Gen.*, n. 5418.—Chois., in *Mém. Gen.*, xiv. 160. —B. H., *Gen.*, 188, n. 27.

[6] Korth., *Verh. Nat. Gesch. Bot.*, 135, t. 25.

(evergreen) sessile or semi-amplexicaul; flowers pedunculate cymose; peduncle compressed, 3- or ∞-flowered; bracts subfoliaceous (*Trop America, Ind. Arch.*[1]).

18. **Caraipa** Aubl.[2]—Flowers nearly of *Bonnetia;* stamens sometimes connate at base; anthers short, introrse, versatile; connective produced at apex in pit, glandular. Germen 3-locular; style at apex thick stigmatiferous, shortly 3-lobed; cells 3; effete often 1, 2; ovules in each cell 2 or more rarely 3, descending; micropyle extrorse superior. Capsule 3-quetrous, septicidal 3-valved; valves of endocarp finally separating from exocarp; columella 3-quetrous or 3-winged. Seeds solitary, flat; embryo exalbuminous; cotyledons large flat, emarginate at base or subarticulate, embracing superior radicle.—Trees; leaves alternate, petiolate, penninerved, crowded with small transverse veins; flowers[3] in clusters often corymbose, simple or compound, axillary or terminal (*Tropical America*[4]).

19. **Mahurea** Aubl.[5]—Flowers of *Caraipa;* petals contorted, more rarely imbricated. Stamens ∞, scarcely connate at base; anthers oblong subbasifixed; connective glandular produced, hollow at apex. Germen perfectly or imperfectly 3-locular; style more or less dilated stigmatiferous at apex; ovules ∞, linear, ∞-seriate, imbricated downwards. Capsule septicidal above; columella short; seeds ∞, linear membranous; embryo exalbuminous straight.—Trees; leaves alternate, often petiolate; stipules small, usually very caducous or (as it seems) flowers[6] in terminal racemes, usually elongated, scantily ramified cymiferous (*Trop. South America*[7]).

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[1] Spec. 3, of which 1 is Asiatic.—Vahl, *Symb. Bot.*, ii. t. 42 (*Hypericum*).—A. Gray, *Amer. Expl. Exp., Bot.*, i. 213 (*Ploiarium*).—Miq., *Fl. Ind.-Bat.*, i. p. ii. 490 (*Ploiarium*).—Tul., in *Ann. Sc. Nat.*, sér. 3, viii. 340.—Walp., *Rep.*, ii. 801; v. 132 (*Ploiarium*), 133; *Ann.*, i. 121.

[2] *Guian.*, i. 561 (part.), t. 223, fig. 3, 4.—J., *Gen.*, 334.—Chois., in *Mém. Gen.*, xiv. 163.—Cambess., *Mém. Ternstr.*, t. 18.—Endl., *Gen.*, n. 5120.—Benth., in *Journ. Linn. Soc.*, v. 61.—B. H., *Gen.*, 188, n. 29.

[3] Sometimes large white sweet-smelling; petals whitish unsymmetrical, in præfloration externally virescent at margin.

[4] Spec. ad 8. Mart. & Zucc., *Nov. Gen. et Spec.*, i. t. 65.—Walp., *Rep.*, i. 374; ii. 802 *Ann.*, i. 121; vii. 375.

[5] *Guian.*, 558, t. 222.—J., *Gen.*, 434.—Desrouss., in *Lamk. Dict.*, iii. 679.—Cambess., in *Mém. Mus.*, xvi. 411, t. 1 C.—DC., *Prodr.*, i. 557.—Spach, *Suit. à Buffon*, iv. 71.—Endl., *Gen.*, n. 5422.—Benth., in *Journ. Linn. Soc.*, v. 64.—Chois., in *Mém. Gen.*, xiv. 158.—B. H., *Gen.*, 188, n. 30.—*Bonnetia* Schreb., *Gen.*, 363 (nec Mart.).

[6] Pink, handsome.

[7] Spec. 3, 4. Tul., in *Ann. Sc. Nat.* sér. 3, viii. 340.—Walp., *Rep.*, ii. 802; *Ann.*, i. 122; vii. 376.

20. **Haploclathra** Benth.[1]—Flowers nearly of *Caraipa* (or *Mahurea*); anthers long, linear. Germen (of *Caraipa*) 3-locular; ovule solitary in each cell, incompletely anatropous, ascendent. Capsule 3-agonal septicidal; axis persistent; "seeds oblong, acute on both sides."—Trees; leaves opposite; flowers in terminal opposite ramified cymiferous racemes (*Trop. South America*[2]).

21 ? **Pœciloneuron** Bedd.[3]—"Sepals 5, equal. Petals 5, contorted. Stamens ∞ (to 20), free or connate at base in ring or very short tube, entire, 5-lobed; anthers linear, erect, basifixed; connective inappendiculate. Germen 2-locular; styles 2, subulate; ovules in each cell 2, ascendent. Fruit . . . ?—A tree; leaves opposite, coriaceous glabrous penninerved; veins crowded parallel; flowers[4] in terminal panicles" (*East. Mount. India*[5]).

22. **Marila** Sw.[6]—Flowers 4, 5-merous; sepals imbricated. Petals very caducous, imbricated. Stamens ∞; filaments short, slender; anthers erect, introrse; connective glandular, produced beyond cells, simple or 2-lobed. Germen 4, 5-locular; style at apex stigmatiferous thick, scarcely lobed; ovules ∞, ∝-seriate, imbricated downwards. Capsule elongated, 4, 5-agonal, septicidal; seeds ∞, base and apex fimbriate-pilose; embryo exalbuminous, thick, short; cotyledons subequal to radicle.—Trees; leaves opposite (evergreen); flowers in axillary racemes (*Trop. America*[7]).

V. PELLICERIEÆ.

23. **Pelliceria** Tri. & Pl.—Flowers regular; sepals 5, short, membranous subpetaloid (coloured), much imbricated; petals 5, much longer than calyx, much imbricated, caducous. Stamens 5, hypogynous alternipetalous; filaments free, slightly dilated at

[1] In *Journ. Linn. Soc.*, v. 64.—B. H., *Gen.*, 189, n. 82.

[2] Spec. 2. Mart. & Zucc., *Nov. Gen. et Spec.*, i. t. 64 (*Caraipa*).

[3] In *Journ. Linn. Soc.*, viii. 267, t. 17.—B. H., *Gen.*, 981, n. 32 *a*.

[4] Whitish yellow.

[5] Spec. 1. *P. indicum*, Bedd., *loc. cit.*

[6] *Prodr. Fl. Ind. Occ.*, 84.—Poir., *Dict.*, Suppl., iii. 590.—Cambess., in *Mém. Mus.*, xvi. 411, t. 17 A.—DC., *Prodr.*, 1. 558.—Endl., *Gen.*, n. 5421.—Benth., in *Journ. Linn. Soc.*, v. 64.—B. H., *Gen.*, 189, n. 31.—*Scyphæa* Presl, *Symb.*, i. 7, t. 4.—*Monoporina* Presl, *Rostl.*, ii. 277 (ex Endl.).—*Anisosticte* Bartl., *Ord. Nat.*, 294, not. (ex Endl.).

[7] Spec. 4. Pœpp. & Endl., *Nov. Gen. et Spec.*, iii. t. 213.—Griseb., *Fl. Brit. W.-Ind.*, 111.—Tr. & Pl., in *Ann. Sc. Nat.* sér. 4, xviii. 258, Walp., *Rep.*, i. 374; v. 133; vii. 376.

base; anthers elongate-linear, inwardly adhering to grooves of style, dorsally inserted slightly above the base; cells submarginal adnate linear, longitudinally rimose. Germen sessile, apex tapering in style, 2-locular; one cell sterile; other 1-ovulate; ovule pendulous from long obclavate funicle, subcampylotropous, descending; micropyle introrse superior; style long conical, longitudinally 5–10-sulcate; apex stigmatiferous minutely 2-denticulate. Fruit "ovate-subturbinate, 10-sulcate, long acuminate coriaceous-spongy, 1-locular, indehiscent. Seed pendulous exalbuminous; testa nearly disappearing; cotyledons wide thick fleshy; radicle straight superior short; plumule long evolute."—A glabrous tree; leaves alternate; limb very unequal, vernation involute, glabrous coriaceous, when young marginate with exserted subclavate denticules, afterwards deciduous; flowers solitary terminal; peduncle short thick; bracts 2, long membranous involute for a long time, including long conical bud (*Central America*). See p. 245.

VI. MARCGRAVIEÆ.

24. **Marcgravia** Plum.—Flowers hermaphrodite, receptacle depressed convex. Sepals usually 4 (?), connate at base, unequal short, much imbricated. Petals 4, 5, connate in coriaceous deciduous calyx-like mass, very short apex alone imbricated 2–5-dentate. Stamens sometimes few, subdefinite in number and 1-seriate verticillate, usually (12–40); filaments often connate at base, otherwise free; anthers subbasifixed, introrsely 2-rimose. Germen superior, apex shortly conical and usually obscurely radiated stigmatiferous; cells 4–∞, complete or incomplete. Ovules ∞, anatropous, descending or horizontal, inserted on ramified-lamellate placenta. Fruit subglobose thick fleshy, indehiscent or finally loculicidal at base. Seeds ∞, oblong, exterior reticulated; embryo fleshy thick; cotylędons often shorter than conical radicle.—Epiphytal or scandent shrubs, more rarely arborescent; leaves alternate heteromorphous; on sterile branches, repent sessile 2-glandular at base, affixed to rocks or trees; in free branches coriaceous exstipulate; flowers in clusters, often umbelliferous terminal; inferior pedicellate often oblique on summit of pedicel; bractlets 2, inserted under flower, analogous to sepals; superior flowers more or less abortive, with sacciform bract, open without and below, longitudinally adnate to pedicel, stipitate (*Tropical America*). See p. 246.

25? **Norantea** Aubl.[1]—Flowers nearly of *Marcgravia;* petals free or connate at base, much imbricated. Stamens ∞, or more rarely few subdefinite; filaments sometimes cohering to petals at base, usually thickened at apex; anthers innate, caducous, introrsely or sublaterally rimose. Germen free; apex conical stigmatiferous 3–5-radiate; ovules in cells (usually incomplete) ∞, inserted on rather thick placenta, usually ascending. Fruit nearly of *Marcgravia.* —Scandent or epiphytal shrubs, sometimes arborescent; leaves alternate, sometimes furnished below with 2-seriate curved glandules, exstipulate; flowers[2] in terminal elongated racemes; bracts axile elevate-connate with pedicel to a greater or less height, sometimes inserted below calyx, usually petiolate; limb sacciform or cuculliform changed into inverse ascidium; bracts 2, lateral, analogous to sepals (*Tropical America*[3]).

26. **Ruyschia** Jacq.[4]—Flowers nearly of *Norantea;* stamens 5, alternipetalous. Gynæceum and fruit nearly of *Marcgravia;* cells 4–6.—Epiphytal or scandent shrubs; leaves alternate entire coriaceous; flowers[5] in terminal racemes; bracts inserted at apex of pedicel, 3-lobed; one lobe ascending, clavate at apex; alternate 2, lateral situated on and hanging from peduncle; bractlets 2, inserted under flower (*Tropical America*[6]).

VII. CARYOCAREÆ.

27. **Caryocar** Allam.—Flowers regular hermaphrodite; receptacle rather convex. Calyx deeply 4–6-fid, much imbricated. Petals 4–6,

[1] *Guian.*, 554, t. 220.—J., *Gen.*, 245.—Poir., *Dict.*, Suppl., iv. 108; *Ill.*, t. 447.—DC., *Prodr.*, i. 566.—Endl., *Gen.*, n. 5460.—B. H., *Gen.*, 181, n. 4.—*Ascium* Schreb., *Gen.*, 358.—*Schwarzia* Velloz., *Fl. Flum.*, v. t. 84.

[2] Often handsome, red.

[3] Spec. ad 12. H. B. K., *Nov. Gen. et Spec.*, vii. 218, t. 647 *bis.*—Cambess., in *A. S. H. Fl. Bras. Mer.*, i. 241, t. 62.—Mart., *Nov. Gen. et Spec.*, iii. 179, t. 295, 296.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 372.—Griseb., *Fl. Brit. W.-Ind.*, 109.—H. Bn., in *Adansonia*, x. 242.—Walp., *Rep.*, i. 398; *Ann.*, vii. 361.

[4] *Stirp. Amer.*, 75, t. 51, fig. 2.—J., *Gen.*, 428.—Poir., *Dict.*, vi. 355; Suppl., iv. 731; *Ill.*, t. 135.—DC., *Prodr.*, i. 556.—Spach, *Suit. à Buffon*, vi. 127.—Lindl., *Veg. Kingd.* 403, fig. 284.—Endl., *Gen.*, n. 5459.—B. H., *Gen.*, 181, n. 5.—H. Bn., in *Payer Fam. Nat.*, 127.—*Souroubea* Aubl., *Guian.*, 244, t. 97.—J., *Gen.*, 428.—*Surubea* Mey., *Prim. Fl. Essequeb.*, 119.—*Loghania* Scop., *Introd.*, n. 1076.

[5] Often handsome, red.

[6] Spec. 9, 10. H. B. K., *Nov. Gen. et Spec.*, vii. 218.—Mart. & Zucc., *Nov. Gen. et Spec.*, iii. t. 292–294.—Benth., *Voy. Sulph., Bot.*, t. 29.—Miq., *Stirp. Surin.*, t. 27.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 376.—Griseb., *Fl. Brit. W.-Ind.*, 110.—H. Bn., in *Adansonia*, x. 241.—Walp., *Rep.*, i. 398; ii. 811; v. 145; *Ann.*, i. 129; vii. 361.

alternate, much imbricated, connate at base among themselves and with base of androceum. Stamens ∞; filaments at base in short cupule 1-adelphous, in bud much contorted, corrugate; interior sometimes short, antherless; anthers small, introrse, versatile, longitudinally 2-rimose. Germen free, 4–6-locular; styles same in number, filiform, elongated, at apex not thickened, stigmatiferous; ovules in each cell 1, inserted at internal angle, incompletely anatropous or suborthotropous; micropyle extrorse superior. Fruit drupaceous, mesocarp butyrous or resinous; putamens 1–4, ligneous, exterior rugose, muricate, aculeate or produced in rigid setæ (penetrating into mesocarp) 1-spermous; seed subreniform; embryo exalbuminous, fleshy, oily, hippocrepiform, macropodal, radicle large clavate or ovate tending towards apex of fruit; tigella much attenuated, colliform inflexed; plumule small. — Trees; leaves opposite, digitate, 3–5-foliolate, folioles coriaceous, subentire or serrate-crenate; stipules 0 or very caducous; flowers in terminal racemes (*Trop. America*). See p. 250.

28. **Anthodiscus** G. F. W. Mey.—Flowers nearly of *Caryocar*, smaller; corolla calyx-like, deciduous. Stamens ∞, 1-adelphous at base, afterwards in phalanges 5, alternipetalous; central filaments in each phalanx, much longer, inflexed; exterior shorter, erect; anthers introrse, 2-locular. Germen 8–12-locular; ovule in each cell, subbasilar suborthotropous; micropyle extrorse, superior; styles 8–12, stigmatiferous at apex. Fruit coriaceous subfleshy, depressed at apex. Seeds compressed at sides; testa membranous, embryo scantily albuminous, radicle very long, spirally contorted tending towards apex of fruit; cotyledons in middle bristled, short, notched-inflexed. Other characters of *Caryocar*.—Trees; leaves alternate, digitate, 2-foliolate; racemes terminal (*Trop. America*). See p. 252.

XXXI. BIXACEÆ.

I. ANNATTO SERIES.

The Annattos[1] (figs. 288–296) have regular hermaphrodite flowers, with a convex receptacle bearing a calyx of five imbricated caducous

Bixa Orellana.

FIG. 288.
Floriferous and fructiferous branch ($\frac{1}{3}$).

sepals, and five alternate petals, larger and much contorted in præfloration. Immediately above is inserted an androceum formed

[1] *Bixa* L., *Gen.*, n. 654.—J., *Gen.*, 293.—GÆRTN., *Fruct.*, i. 202, t. 61.—POIR., *Dict.*, vi. 229; Suppl., iv. 691; *Ill.*, t. 469.—DC., *Prodr.*, i. 259.—TURP., in *Dict. Sc. Nat.*, Atl., t. 149.—SPACH, *Suit. à Buffon*, vi. 116.—ENDL., *Gen.*, n. 5061.—CLOS, in *Ann. Sc. Nat.*, sér. 4, viii.

of an indefinite number of hypogynous stamens, the filaments free or very slightly polyadelphous, and reflexed in the bud towards the apex. This bears a two-celled extrorse anther, presenting

Bixa Orellana.

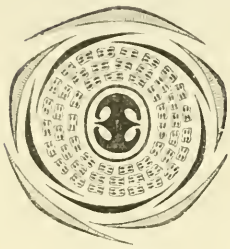

Fig. 290.
Diagram.

Fig. 289.
Bud ($\frac{2}{1}$).

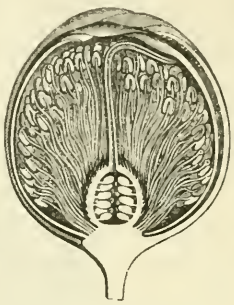

Fig. 291.
Long. sect. of seed.

Fig. 292.
Gynæceum ($\frac{4}{1}$).

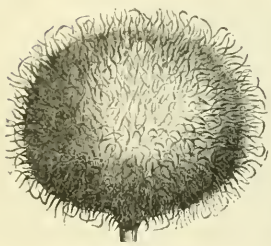

Fig. 293.
Fruit.

Fig. 295.
Seed ($\frac{3}{1}$).

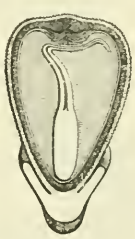

Fig 296.
Long. sect. of bud.

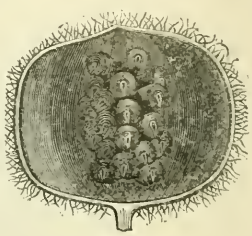

Fig. 294.
Long. sect. of fruit (antero-posterior).

decided peculiarities. It is folded back upon itself towards the middle of its height, thus representing a kind of horseshoe. It is at the summit of the convexity of this curvature, that is to say, towards the middle of its height, that each cell begins to open by a longitudinal cleft, ultimately more or less prolonged towards its two branches. The gynæceum is superior; it is composed of a one-celled ovary surmounted by a hollow style, with apex stigmatiferous, not swollen, terminated by two very small stigmatiferous crenatures. In each ovary cell are found two parietal lateral placentas,

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260.—Payer, *Fam. Nat.*, 110.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 79.—B. H., *Gen.*, 125, 971, n. 3.—*Urucu* Marcgr. (ex Adans., *Fam. des Pl.*, ii. 381).—*Achioti* Hern., *Thes.*, 74.—*Mitella* T., *Inst.*, 242 (part.).

but little prominent, each giving insertion to two lateral series of anatropous ascendent ovules, with micropyle turned downwards and outwards.[1] The fruit becomes a capsule, compressed from one side to the other, and generally covered with more or less rigid prickles; it opens into two lateral panels, the internal face supporting a vertical mesial placenta, but little prominent. At maturity, the membranous endocarp is generally separated from the exocarp. The seeds, indefinite in number, are supported by a funicle dilating round the hilum in a short aril in the form of a cuff (figs. 295, 296). The other extremity of the seed is larger, and presents a thick[2] circular chalaza. The coats are triple. The exterior, membranous and cellular, is full of yellow or reddish granules, constituting the tinctorial substance of the Annattos. The fleshy albumen envelops an axile embryo, coloured green, with cylindro-conical radicle, and foliaceous cotyledons digitinerved at the base.

This genus includes one or two arborescent species,[3] with yellow or red-coloured juice, simple, alternate leaves, palminerved at the base, petiolate, accompanied by two lateral caducous stipules. The flowers[4] are united at the summit of the branches in ramified clusters of cymes, the pedicels bearing on their upper part five glands under the flowers. The Annattos are natives of tropical America, and have been introduced into all the warm countries of the globe.

The Annattos constitute by themselves a small subseries (of *Eubixeæ*). *Oncoba* forms a neighbouring subseries in which *Carpotroche*, *Mayna*, and *Dendrostylis* are found united, only representing, as we think, different sections of the same genus. In all these plants the diœcious or polygamous flowers have imbricated sepals and petals varying in number, numerous stamens, the anthers of which, often elongated and straight, open longitudinally by two clefts. The fruit is extremely variable as to the consistence of the pericarp, and the state of its exterior surface.

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[1] They have two coats.

[2] When the seeds begin to dry, the region of the chalaza contracts, drawing with it the seminal segments, and becomes more or less concave, so as to resemble to a certain extent the micropyle of an orthotropous seed (figs. 291, 295).

[3] H. B. K., *Nov. Gen. et Spec.*, v. 353.—Wight, *Ill.*, t. 17.—Miq., *Fl. Ind.-Bat.*, i. 107; *Fl. Sum.*, 159.—Oliv., *Fl. Trop. Afr.*, i. 113.—A. Gray, *Amer. Expl. Exp., Bot.*, i. 72.—Tul., in *Ann. Sc. Nat.*, sér. 3, vii. 296.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 93.—*Bot. Mag.*, t. 1456.—Walp., *Ann.*, vii. 222.

[4] Pretty large, handsome, pink.

II. FLACOURTIA SERIES.

Flacourtia[1] (figs. 297–300) has unisexual flowers, diœcious or more rarely polygamous. The calyx is formed of from three to five sepals,[2] imbricated or scarcely touching at their edges, sometimes very small in the female flowers. Within it the edge of the receptacle is swollen into a circular disk, continuous or lobed, or formed

Flacourtia Cataphracta.

Fig. 297.
Flower ($\frac{1}{1}$).

Fig. 298.
Longitudinal section of flower.

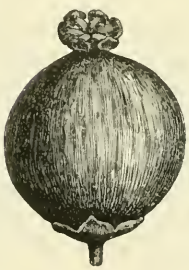

Fig. 299.
Fruit ($\frac{2}{1}$).

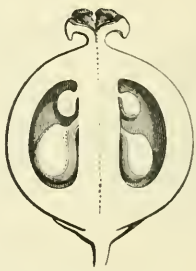

Fig. 300.
Longitudinal section of fruit.

of independent glands, sometimes ciliate, generally more developed in the female flowers, where it may be surrounded by small stamens, often sterile. In the male flowers the stamens are very numerous, covering all the receptacle, surrounded by the cushion of the disk, each formed of a free filament and a short anther, extrorse, two-celled, versatile, dehiscing by two longitudinal clefts.[3] The gynæceum, of

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[1] Commers. ex Lher., *Stirp.*, 95, t. 30, 30 *b* (1784). — J., *Gen.*, 291 (*Flacurtia*).—Poir., *Dict.*, vi. 65; Suppl., iv. 653; *Ill.*, t. 826.—DC., *Prodr.*, i. 256.—Spach, *Suit. à Buffon*, vi. 133.—Turp., in *Dict. Sc. Nat.*, Atl., t. 150.—Endl., *Gen.*, n. 5079.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 212.—Payer, *Fam. Nat.*, 112.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 86.—B. H., *Gen.*, 128, n. 17.—*Stigmarota* Lour., *Fl. Cochinch.*, 633.

[2] Often squamiform, ciliate.

[3] The connective is often 2-fid at its lower extremity (which becomes the upper after the reciprocating movement of the anther) and each of its branches, sometimes coloured, is applied against the back of one of the cells.

which there is generally no trace in the male flowers, is composed of a free ovary, surmounted by a variable number (two to ten or twelve) of stylary branches, the summits stigmatiferous dilated, often bilobed, reflexed or revolute. In the interior of the ovary may be observed an equal number of parietal placentas advancing sometimes even to the axis of the cell, where they come in contact, each supporting two or a larger number[1] of descendent anatropous ovules, with micropyle looking upwards and outwards. The fruit is a drupe, the pericarp finally containing as many nuts as there had been incomplete cells. In each one or more seeds are found, the coats covering a fleshy albumen, and an axile embryo with cotyledons often orbicular.

Flacourtia consists of trees or shrubs, frequently thorny, inhabiting all the warm regions of the Old World. The leaves are alternate, petiolate, articulate, accompanied by stipules, generally very small, with small flowers disposed in axillary cymes, or grouped upon simple or ramified axes, analogous to spikes, racemes or umbels. A great number of species have been described,[2] now reduced to a dozen, comprising *Bennettia Horsfieldii*,[3] a Javanese species, with small female flowers, often trimerous.

Beside *Flacourtia* are ranged: *Xylosma* (figs. 301, 302), scarcely differing from it by its flowers in four, five, or six parts, its placentas from two to six in number, its style entire or almost wanting, or divided above into lobes corresponding in number with the placentas; *Dovyalis*, the sepals of which are scarcely imbricated, and the placentas supporting a much smaller number of ovules; *Trimeria*, which has as many petals as sepals—viz., from three to five, and the flowers of *Dovyalis*, with a fruit which opens at the apex; *Peridiscus*, the ovary of which, surmounted by a tolerably large number of radiating styles, is thickened into a disk as far as the middle of its height, and is surrounded by from four to five almost valvate sepals, and by a verticil of tolerably numerous stamens, the filaments being

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[1] There are often two, superposed one to the other, or nearly so, the upper being early less developed than the lower. They have two envelopes.

[2] H. B. K., *Nov. Gen. et Spec.*, vii. 238.—Roxb., *Pl. Corom.*, t. 68, 69, 222.—Wight & Arn., *Prodr.*, i. 29.—Reichb., *Consp.*, 188 (*Rhamnopsis*). — Wight, *Icon.*, t. 85. — A. Gray, *Amer. Explor. Exp., Bot.*, 75.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 102; *Fl. Sum.*, 158.—Turcz., in *Bull. Mosc.* (1863), i. 553.—H. Bn., in *Adansonia*, x. 250.—Tul., in *Ann. Sc. Nat.*, sér. 5, ix. 340.—Oliv., *Fl. Trop. Afr.*, i. 120.—Walp., *Ann.*, vii. 228.

[3] Miq., *Fl. Ind.-Bat.*, i. p. ii. 105.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 87.—B. H., *Gen.*, 128, n. 18.—H. Bn., in *Adansonia*, x. 251.—Walp., *Ann.*, vii. 228.

lodged in the vertical furrows of the disk. The single ovary cell encloses from six to eight ovules, inserted nearly at its summit. In *Lætia*, the petaloid sepals are, on the contrary, much imbricated, and the ovary has three parietal pluriovulate placentas, and a single style with swollen stigmatiferous apex, entire or slightly three-lobed. Hermaphrodite in the two latter genera, in *Idesia* the flowers are dicœcious, as in *Dovyalis* and *Trimeria*, their receptacle enlarged into a kind of plate, recalling the cup-shape which it takes in the *Samydeæ*. Upon its edges it bears an imbricated calyx, and more internally, stamens in great number, with a small rudimentary gynæceum in the centre. In the female flowers this becomes fertile, with from three to six pluriovulate placentas, a similar number of styles divergent from the base, and a fleshy indehiscent fruit, the numerous seeds lodged in a soft pulp.[1]

Xylosma Paliurus.

FIG. 301. Female flower ($\frac{8}{1}$).

FIG. 302. Long. sect. of female flower.

III. SAMYDA SERIES.

Samyda[2] (figs. 303–306), which has given its name to this group, does not represent, as we shall presently see, the most perfect type of it. These are, we may say, perigynous *Flacourtieæ*, with regular, hermaphrodite, and apetalous flowers. The receptacle has the form of a cup more or less elongated into a tube, bearing on its edges a petaloid perianth,[3] continuous with it, the five divisions being disposed in the bud in quincuncial præfloration: there are rarely four or

[1] The genus *Streptothamnus* (F. MUELL., *Fragm. Phyt. Austral.*, iii. 27;—BENTH., *Fl. Austral.*, i. 108;—B. H., *Gen.*, 972, r. 7 *a*) has been ascribed doubtfully to this group. It is incompletely known, having flowers with five imbricated sepals and petals, numerous stamens with apiculate anthers, and an ovary with parietal multiovulate placentas, surmounted by a style with peltate stigmatiferous extremity. The fruit is a polyspermous berry with albuminous seeds. The two known species are voluble, with alternate entire trinerved leaves and axillary solitary flowers.

[2] L., *Gen.*, n. 543.—J., *Gen.*, 439.—GÆRTN. F., *Fruct.*, iii. 239, t. 224.—POIR., *Dict.*, vi. 487; Suppl., v. 31.—LAMK., *Ill.*, t. 355.—DC., *Prodr.*, ii. 47.—TURP. in *Dict. Sc. Nat.*, Atl., t. 245, 246.—ENDL., *Gen.*, n. 5059.—PAYER, *Fam. Nat.*, 93.—B. H., *Gen.*, 791, n. 5.—*Sadymia* GRISEB., *Fl. Brit. W.-Ind.*, 25.

[3] White, pink, or greenish.

six imbricated divisions. The androceum is formed of from eight to fifteen stamens, the monadelphous filaments inserted at the throat of the receptacle forming a tube, being united to a greater or less height with the perianth. Their summits are free for a variable distance, often inconsiderable, each bearing a two-celled introrse anther

Samyda serrulata.

FIG. 303. Bud ($\frac{3}{2}$).

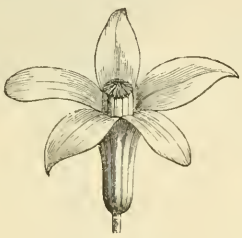

FIG. 304. Flower.

FIG. 305. Diagram.

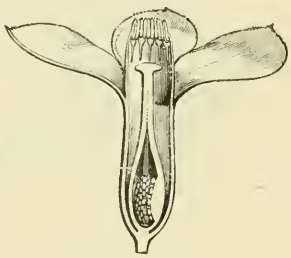

FIG. 306. Longitudinal section of flower ($\frac{3}{2}$).

dehiscing by two longitudinal clefts.[1] The gynæceum is free, and occupies the bottom of the cup-shaped receptacle ; it is formed of a one-celled ovary, surmounted by a style, the stigmatiferous extremity dilated into a head. Upon the walls of the ovary are seen from three[2] to five placentas, bearing anatropous ovules.[3] The fruit is more or less fleshy or coriaceous, and terminates by opening from above downwards in three, four or five valves. It contains numerous seeds, each surrounded by a fleshy aril, often laciniate, and the crustaceous coats covering a fleshy albumen and an axile embryo with conical radicle and foliaceous cotyledons. *Samyda* consists of shrubs of the Antilles, and the neighbouring regions of the mainland. The leaves are alternate distichous, spotted with glandular pellucid dots. The short petiole is accompanied by two small lateral stipules. The flowers are solitary or disposed in small cymes in the axils of the leaves. Only three or four species are known.[4]

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[1] Pollen "ovoid-rounded, with four short folds; in water spherical with four short bands, upon these bands papillæ." (H. MOHL., in *Ann. Sc. Nat.*, sér 2, iii. 327.)

[2] In this case two of the placentas are posterior (PAYER).

[3] Their hilum is often concave and surrounded by a circular pad. The region of their micropyle is curved at a late period, so as to give them the appearance of campylotropous ovules. They have double coats. Generally the upper attenuated part of the placenta bears no ovules; it is prolonged into the interior of the tubular style.

[4] JACQ., *Collect.*, ii. t. 17.—SW., *Fl.-Ind. Occ.*, ii. 758.—VENT., *Ch. de Pl.*, t. 43.—GRISEB., *Fl. Brit. W.-Ind.*, 24.—*Bot. Mag.*, t. 550.

Beside *Samyda* is placed *Guidonia* (figs. 307–309), distinguished by a receptacular cup generally more extended, and perigynous stamens, from five to fifteen or twenty in number, united among themselves, and with an equal number of glandular or petaloid tongues, alternating with them, and often covered with hairs. The whole

Guidonia ilicifolia.

FIG. 307.
Flower ($\frac{4}{1}$).

FIG. 308.
Diagram.

FIG. 309.
Longitudinal section of flower.

of this combination frees itself from the single envelope of the flower at a greater or less height. The ovary contains three or four parietal pluriovulate placentas. The flowers in this genera are solitary, or more generally united in cymes, often umbelliferous. In *Osmelia*, consisting of Asiatic plants, the flowers are disposed in slender racemes, and have from eight to ten stamens, united with an equal number of villous tongues.

In *Euceræa* there are eight stamens and eight alternate tongues bearded at the summit; but the stigma is represented at the apex of the ovary by four or six sessile rays, and there are only one or two ascendent ovules in the ovary. The flowers are numerous on axillary ramified spikes. *Lunania*, nearly allied to the preceding genera, is immediately distinguished from it, inasmuch as the flowers, disposed in long spikes, have a membranous valvate calyx, which is irregularly torn at anthesis, stamens with extrorse anthers, and in their intervals glands with which they are united below into a single cup, glandular and thick, often glabrous, sometimes bifid. *Tetrathylacium*, which appears allied to the preceding genera, has four stamens alternate with the imbricated sepals, without intervening tongues, the flowers being collected in ramified spikes.

Ryania (figs. 310–313) has great affinity with the preceding genera, although it has been generally placed in a totally different group—that of *Passifloreæ*. It has quite the vegetative organs of certain species of *Guidonia*, and a slightly concave receptacle upon the edges of

which at a variable height a prolongation of the disk is found, sometimes very marked. Round this is inserted an indefinite number of stamens, and more externally five sepals much imbricated, the

Ryania speciosa.

FIG. 310.
Flower.

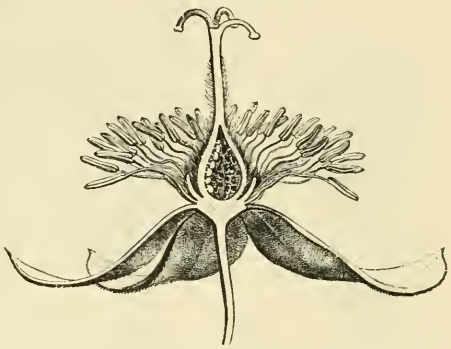

FIG. 312.
Longitudinal section of flower.

three interior even convoluted in the bud. The unilocular ovary has three, four, or five parietal pluriovulate placentas, and the style is divided above, to a variable distance, in as many branches, stigmatiferous at the apex. The woody or suberous fruit contains seeds provided with a fleshy aril.

Ryania speciosa.

FIG. 313.
Gynæceum ($\frac{2}{1}$).

It is by these characters that the small subseries of *Ryanieæ*, constituted by a single American genus, is distinguished from that of *Eusamydeæ*, formed of the five preceding genera.

Scolopia, generally ranged among the *Flacourtieæ* proper, belongs, according to us, to a third subseries, very nearly related to that in which *Casearia* is found, for it has the same fundamental organization. The receptacle has the form of a cup or patera, the edges and upper surface bearing the perianth and androceum; these are therefore really perigynous. The sepals, from three to six or seven in number, have often in their intervals a like number of petals of nearly the same size and colour. The anthers are often surmounted by a linear prolongation of the connective. Among the *Scolopieæ*

FIG. 311.
Diagram.

are placed: *Ludia*, having a patera-shaped receptacle, from five to eight sepals, much imbricated, without corolla, a gynæceum analogous to that of *Ryania*, *Casearia*, and *Scolopia*; *Kuhlia*, consisting of American plants, scarcely distinguished from *Ludia* by a slightly more concave receptacle, and the coloured sepals, from three to five in number, which are imbricated, the fruit being fleshy and indehiscent; *Banara*, which, with the fruit and flower of *Kuhlia*, has a calyx of from three to five valvate sepals, and a similar number of petals, similar to the sepals, but imbricated; *Aphloia*, which, with the receptacular cup of *Scolopia*, and a much imbricated calyx, has only one carpel and one parietal placenta in the ovary; *Azara* (figs. 314, 315), which has the same cup-like receptacle, sepals valvate or nearly so, without corolla, a unilocular ovary with several placentas, but surmounted by a simple style, the fleshy fruit being scarcely dehiscent at the apex; *Pyramidocarpus*, which has the folioles of the perianth variable in number, three sepals, then from six to ten sepaloid petals passing gradually from the pieces of the calyx to those of the androceum.

Azara crassifolia.

Fig. 314. Flower ($\frac{4}{1}$).

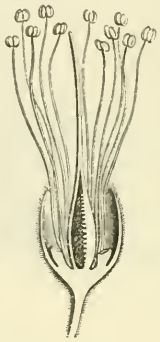

Fig. 315. Long. sect. of flower.

A last subseries, *Abatieæ*, is formed of one single genus *Abatia*, which has the concave receptacle of *Guidonia*, tetramerous apetalous flowers, valvate sepals, perigynous stamens, from five to ten in number, or still more considerable, accompanied or not by sterile filiform filaments, the leaves in all the species being opposite, without stipules, and the flowers small, numerous, and arranged in terminal racemes.

IV. LACISTEMA SERIES.

Lacistema,[1] which seems to us to have been rightly indicated as a reduced type of *Bixaceæ*, has flowers (figs. 316–319) united in

[1] Sw., *Prodr.* (1788), 12; *Fl. Ind. Occ.*, ii. 1091, t. 21.—Poir., *Dict.*, Suppl., iii. 232.— Mart., *Nov. Gen. et Spec.*, i. 56, t. 94, 95.— Lindl., *Veg. Kingd.*, 329, fig. 225.— Endl.,

small polygamous, or more usually hermaphrodite, spikes. In the latter the receptacle has the form of a small cone, supporting first a calyx, formed of from four to six narrow unequal sepals incurved

Lacistema myricoides.

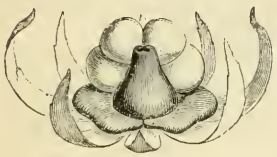

FIG. 317.
Young flower, anterior side.

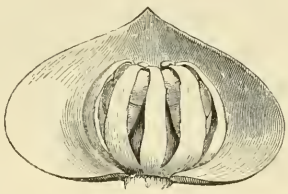

FIG. 316.
Bud in the axil of a bract ($\frac{2}{1}$).

FIG. 318.
Young flower, posterior side.

at the summit when young, persistent, sometimes very small or even disappearing almost completely. Within the calyx a glandular disk is found, having the form of a circular cupule, nearly regular and regularly lobed upon the edges, or more frequently very unequal and especially developed upon the anterior side of the flower. More internally, the androceum is only represented by a single free hypogynous stamen with the filament dilated above into a glandular bifurcate connective, and each short branch of which supports an isolated anther cell, dehiscing towards the edges, or a little more within, by a longitudinal cleft.[1] The free and superior gynæceum is 1-celled, and attenuated above into a style the summit of which separates into three stigmatiferous branches, slender, recurved, often very unequal.[2] The ovary cell contains three parietal placentas, alternating with the divisions of the style. Each gives insertion to two or one single ovule, descendent, incompletely anatropous, with superior and interior[3] micropyle. The fruit at first slightly fleshy, ends by becoming a loculicidal capsule,

Lacistema myricoides.

FIG. 319.
Long. sect. of young flower (antero-posterior).

Gen., n. 1907. — PAYER, *Fam. Nat.*, 156. — SCHNIZL., in *Mart. Fl. Bras.*, fasc. 38, 279. — A. DC., *Prodr.*, xvi. 591. — H. BN., in *Adansonia*, x. 256. — *Synzyganthera* RUIZ. & PAV., *Prodr.* (1794), 137, t. 30. — *Nematospermum* L. C. RICH., in *Act. Soc. Hist. Nat. Par.* (1792), 105. — GUILLEM., in *Dict. Class. Hist. Nat.*, ix. 499. — *Lozania* MUT., in *Sem. Nov. Gran.* (1810), 20. — DC., *Prodr.*, iii. 30. — ENDL., *Gen.*, n. 6074. — PL., in *Ann. Sc. Nat.*, sér. 4, ii. 265. — *Didymandra* W., *Sp. Pl.*, iv. 971.

[1] According to SCHNIZLEIN, the pollen grains are oval, smooth, or with three folds.

[2] Two are anterior, and often much more developed than the posterior.

[3] With two coats.

the three valves presenting within upon the midrib a prominent placenta. One among them bears a descendent seed, the superficial fleshy coat and the crustaceous testa covering a thick fleshy albumen. In the axis of this is formed a straight embryo with long superior radicle and foliaceous cotyledons.

Lacistema consists of small trees or shrubs of tropical America, fifteen species being distinguished.[1] The leaves are alternate, with a petiole articulated at the base and accompanied by two lateral caducous stipules, the limb being simple, penninerved, and sometimes covered with pellucid punctures. The flowers are united in small amentiform spikes, being numerous in the axil of a given leaf, where they are themselves collected in spikes. They differ much in age, and also in their very various states of development. The slender axis of each bearing alternate bracts, imbricated at first, uniflorous, and accompanied by two lateral bractlets, similar to the sepals, but generally narrower.

V. CALANTICA SERIES.

Calantica[2] (figs. 320, 321) has regular hermaphrodite flowers. The receptacle has the form of a spreading porringer, on the edges of which from five to eight valvate sepals are inserted, and a like number

Calantica cerasifolia.

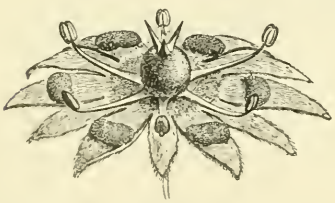

Fig. 320.
Flower ($\frac{4}{1}$).

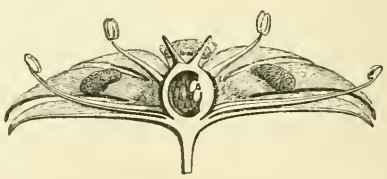

Fig. 321.
Longitudinal section of flower.

of perigynous, alternate, linear petals. In the intervals of the petals is found a large gland, concave within, spreading to a tolerable distance over the internal face of the sepals. The stamens are the

[1] Berg., in *Act. Helv.*, vii. t. 10 (*Piper*).—Rudge, *Guian.*, t. 4 (*Piper*).—Miq., in *Linnæa*, xviii. 24.—A. DC., *loc. cit.*, 591–594.—Walp., *Ann.*, iv. 228 (*Lozania*).

[2] Tul., in *Ann. Sc. Nat.*, sér. 4, viii. 74.—Payer, *Fam. Nat.*, 83.—B. H., *Gen.*, 799, n. 12.—H. Bn., in *Adansonia*, x. 256.

same in number as the petals to which they are superposed. They are slightly perigynous, but are inserted lower and more internally than the petals. Their filaments are free, and their anthers 2-celled, extrorse, dehiscing by two longitudinal clefts. The gynæceum is free, composed of a 1-celled ovary, surmounted by from three to six linear styles, stigmatiferous towards the summit. There are an equal number of parietal placentas, alternating with the styles and supporting numerous ovules, arranged in several ranks. The fruit, accompanied at its base by the persistent perianth, is a plurivalved and polyspermous capsule. The seeds, inserted upon the middle of each valve, are covered with cottonous threads, and contain under their coats a fleshy albumen, surrounding an embryo with cylindrical superior radicle and nearly oval foliaceous cotyledons.

Calantica consists of trees from the Mascareign Isles. In the two known species[1] the leaves are alternate, simple, petiolate, accompanied by two lateral stipules. The teeth of the limb are glandular. The flowers are disposed in ramified clusters of cymes, and accompanied by setaceous bracts and bractlets.

Under the name of *Bivinia Jalberti*[2] is distinguished an apetalous *Calantica*, the stamens of which, instead of being solitary, are grouped in bundles placed before each petal, so that their total number is fifty or sixty. This is a shrub of the Eastern Isles of tropical Africa, whose organs of vegetation and fruit are nearly the same as those of *Calantica*, and the inflorescence axillary.

Beside *Calantica* are placed *Dissomeria* and *Asteropeia*, which have nearly the same receptacle. The former has a double corolla and numerous stamens; the latter a single pentamerous corolla and from ten to fifteen stamens, united at their base in a short ring, and in an entirely free ovary, three pluriovulate placentas advancing into the cavity of the ovary, so as to divide it below into almost complete cells.

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[1] DC., *Prodr.*, ii. 54 (*Blackwellia*).—Vent., *Choix de Pl. Jard. Cels.* (1803), t. 56 (*Blackwellia*).

[2] Tul., in *Ann. Sc. Nat.*, sér. 4, viii. 78.—B. H., *Gen.*, 800, n. 13.—Mast., in *Oliv. Fl. Trop. Afr.*, ii. 496.

VI. HOMALIUM SERIES.

The Acomas[1] (figs. 322–325) have regular hermaphrodite flowers. The receptacle has the form of a short cornet or a turbinate sac, in the concavity of which is inserted the lower part of the gynæceum; after which the receptacle widens into a shallow cup, bearing a calyx or corolla upon the edges without or within. The leaves of both are

Homalium racemosum.

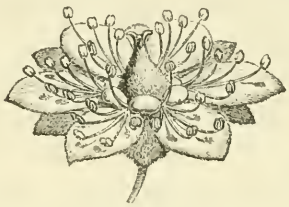

Fig. 322.
Flower ($\frac{3}{1}$).

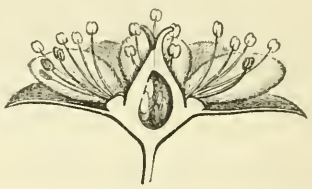

Fig. 323.
Longitudinal section of flower.

variable in number, generally from five to eight. The sepals are valvate or slightly imbricated. The corolla is formed of a like number of alternate petals, often analogous to the sepals in colour and consistence, but more developed, imbricated, or contorted in præfloration. In certain species, such as *H. paniculatum, integrifolium, napaulense*, become types of the genus *Blackwellia*,[2] there is in front of each petal a stamen, like it also inserted on the throat of the receptacle, and formed of a free filament and a 2-celled extrorse anther dehiscing by two longitudinal clefts. In *H. racemosum*, on the contrary, and in a great many neighbouring species, there are two stamens or a bundle formed of a variable number of these organs in front of each petal.[3] In all the species the alternipetalous glands are interposed to bundles of stamens, on a level with which they are inserted. The partly in-

[1] *Homalium* Jacq., *Stirp. Amer.* (1763), 173, t. 183, fig. 72.—J., *Gen.*, 343, 452.—Lamk., *Dict.*, i. 32; Suppl., i. 112; *Ill.*, t. 483.—DC., *Prodr.*, ii. 53.—Endl., *Gen.*, n. 5086.—Payer, *Fam. Nat.*, 83.—Benth., in *Journ. Linn. Soc.*, iv. 83.—B. H., *Gen.*, 800, n. 15 (incl.: *Acoma* Adans., *Astranthus* Lour., *Blackwellia* J., *Cordylanthus* Bl., *Lagunezia* Scop., *Myriantheia* Dup.-Th., *Napimoga* Aubl., *Nisa* Noronh. (!), *Pythagorea* Lour., *Racoubea* Aubl., *Tattia* Scop., *Vermontea* Scop.).

[2] Comm., ex J., *Gen.*, 343.—Lamk., *Dict.*, i. 428; Suppl., i. . . . ; *Ill.*, t. 412.—DC., *Prodr.*, ii. 54.—Endl., *Gen.*, n. 5087.—Payer, *Fam. Nat.*, 83.—*Astranthus* Lour., *Fl. Cochinch.*, 221.—*Nisa* Noronh., ex Dup.-Th., *Nov. Gen. Madag.*, 24.—DC., *Prodr.*, ii. 55.—Endl., *Gen.*, n. 5091.—Payer, *Fam. Nat.*, 82.

[3] Character of a section which formerly constituted the genus *Racoubea* (Aubl., *Guian.* (1775), i. 236;—*Napimoga* Aubl., *loc. cit.*, 592, t. 237; *Myriantheia* Dup.-Th., *Gen. Nov. Madag.*, 21;—Endl., *Gen.*, n. 5090;—*Cordylanthus* Bl., *Mus. Lugd.-Bat.*, ii. 27, t. 3).

ferior ovary is unilocular, with three, four, or a greater number of placentas, each bearing one,[1] two, or a larger number of anatropous and descendent ovules. The free summit of the ovary is surmounted by style branches equal in number to the placentas with which they alternate, and stigmatiferous at their scarcely swollen apex. The fruit is a capsule round which persists the receptacle and the hardened perianth. It opens at the summit into as many valves as there are carpels separating to allow the seeds to escape which have a fleshy albumen, an axile embryo, with but little developed foliaceous cotyledons. As many as thirty[2] Acomas are known, natives of all the warm regions of the world. They are trees or shrubs, with alternate simple petiolate leaves, with or without stipules. Their flowers are disposed in axillary, ramified multiflorous racemes.

Homalium (*Nisa*) *involucratum*.

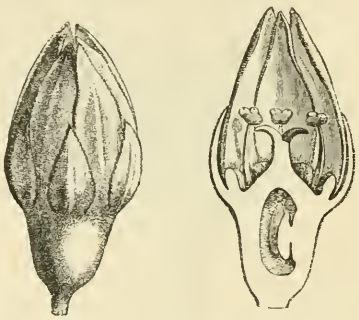

Fig. 324. Bud ($\frac{5}{1}$).

Fig. 325. Long. sect. of bud.

Byrsanthus[3] (fig. 326) is very slightly different from *Homalium*. The flowers have the same general organization, even to the concave receptacle, gynæceum, and mode of placentation. But the sepals, five or six in number, are thicker, and the petals coriaceous, connivent in the shape of the bowl of a spoon concave within with induplicate edges. The stamens are generally three times as numerous as the petals. There is first one in front of each petal, and outside it a gland is found, then more externally another pair of stamens. These are free, formed of a slender filament and a 2-celled extrorse anther. Round the gynæceum are seen five other glands more interior than the preceding, and alternate with them. The fruit is a

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[1] In the section *Nisa* (fig. 325).

[2] Sw., *Fl. Ind. Occ.*, 989, t. 17.—Lindl., in *Bot. Reg.*, t. 1308.—Wall., *Pl. As. Rar.*, t. 179.—Deless., *Ic. Sel.*, iii. t. 53 (*Blackwellia*). —Vent., *Ch. de Pl.*, t. 55–57 (*Blackwellia*). Wight, *Icon.*, t. 1851.—Bl., *Mus. Lugd.-Bat.*, ii. 28.—Benth., *Fl. Hongk.*, 122; *Fl. Austral.*, iii. 309; *Niger*, 361.—Tul., in *Ann. Sc. Nat.*, sér. 4, viii. 58 (*Blackwellia*), 65 (*Myrianthea*), 67 (*Nisa*).—Mast., in *Oliv. Fl. Trop. Afr.*, ii. 497.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4. xvii. 118.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 714. —Harv. & Sond., *Fl. Cap.*, i. 72 (*Blackwellia*).

[3] Guillem., in *Deless. Ic. Sel.*, iii. 30, t. 52 (nec Presl).—Lindl., *Veg. Kingd.*, 742, fig. 446.—Payer, *Fam. Nat.*, 83.—B. H., *Gen.*, 800, n. 16.—*Anetia* Endl., *Gen.*, n. 5088.

capsule opening at the summit into as many panels as there are carpels and styles, that is to say, four or five. The seeds mostly abort, except one, which fills almost the whole of the fruit, and contains under its coats a fleshy albumen, enveloping a conical superior radicle with large foliaceous cotyledons. The leaves are alternate, stipulate, and the articulate flowers are disposed like those of *Homalium*, upon ramified axes; but their pedicels are extremely short. Two species[1] of *Byrsanthus* are described, natives of tropical Western Africa, trees with simple alternate leaves, and flowers collected in racemes or spikes.

Byrsanthus Brownii.

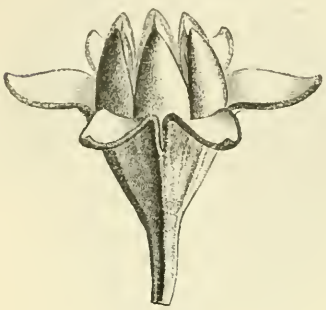

Fig. 326.
Fruit ($\frac{3}{1}$).

VII. PANGIUM SERIES.

The flowers in this series are diœcious or polygamous. Those of *Pangium*[2] (figs. 327–329) have a gamosepalous, valvate calyx unequally torn at anthesis. More internally the convex receptacle bears from five to eight imbricated petals, each presenting within its base a tolerably flattened scale. The stamens are indefinite in number in the male flower, and each formed of a thick filament, swollen and fleshy, tapering at the apex, which supports an oval two-celled introrse anther, dehiscing by two longitudinal clefts. In the female flower the perianth is the same, and the stamens, few in number, are generally reduced to hypogynous tongues. The gynæceum is composed of a sessile ovary, surmounted by a wide glandular plate stigmatiferous, irregularly divided into two, three, or four lobes by shallow furrows. In the interior of the ovary there is but one cavity, with two or three parietal placentas, but little prominent, each supporting a variable number of anatropous ovules, horizontal

[1] Mast., in *Oliv. Fl. Trop. Afr.*, ii. 498.

[2] Rumph., *Herb. Amboin.*, ii. 182, t. 59.—Reinw., in *Syllog. Pl. Soc. Ratisb.*, ii. 12.—Bl., *De Nov. Quib. Plant. Fam. Exp.* (ex *Ann. Sc. Nat.*, sér. 2, ii. 90); *Rumphia*, iv. 20, t. 178; *Mus. Lugd.-Bat.*, i. 14.—Benn., *Pl. Jav. Rar.*, 205, 208, t. 43.—Lindl., *Veg. Kingd.*, 323, fig. 223.—B. H., *Gen.*, 129, n. 23.—Lem. & Dcne., *Tr. Gén.*, 427.—Schnizl., *Iconogr.*, t. 195 *a*.

or a little oblique, disposed in two vertical series. The fruit is an enormous globular, indehiscent berry, the interior containing a great number of large seeds, lodged in the pulp, irregular, compressed, presenting upon one of the edges a long, narrow, umbilical cicatrix, the woody coats bearing externally a rich network of prominent nerves. In the interior is found a thick oily albumen, at the centre of which is a large embryo, with more or less oblique conical radicle, and large foliaceous cotyledons, cordate or digitinerved at their base. Only one species of *Pangium*[1] is known. It is a Japanese tree, bearing alternate petiolate leaves, with two lateral stipules, more or less adnate to the peticle, often persistent, and a cordate limb digitinerved at the base, entire or trilobed. Its flowers are axillary, the female ones solitary, the male disposed in ramified clusters of cymes.

Pangium edule.

Fig. 327.
Male flower.

Pangium edule.

Fig. 328.
Seed.

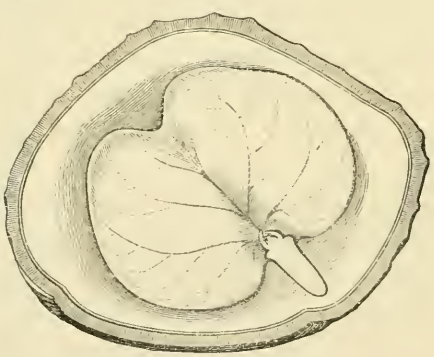

Fig. 329.
Longitudinal section of seed.

Close beside *Pangium* are placed: *Gynocardia*, having the same general organization, with a valvate but cupuliform calyx allowing

[1] *P. edule* Reinw., *Cat. Pl. Buitenz.*, 112.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 109.—Walp., *Rep.*, v. 58; *Ann.*, ii. 62.—*Cloak* v. *Klobach* Rademach., *Besk. Jav. Pl.*, 21; *Bijd.*, 52.—*Pangi* Rumph., *loc. cit.*—Buch., *Dec.*, v. t. 7.

the corolla in the bud to issue above it elongated, anthers, and an ovary with five multiovulate placentas, surmounted by an equal number of style divisions, with a large stigmatiferous head; *Bergsmia*, which, with the perianth of *Pangium*, has much smaller flowers in racemes, and nearly as many alternate stamens as petals. In the female flowers they are reduced to four or five sterile tongues; in the male, their filaments are joined below into a tube round the rudiment of a gynæceum, and their radiating anthers, at first introrse, turn their lines of dehiscence decidedly upwards. In *Trichadenia* the calyx is unequally torn or detached circularly at the base. The stamens are narrow and elongated, like those of *Gynocardia;* but the cells are marginal, and the androceum isostemonous. The placentas are generally uniovulate. *Hydnocarpus* has from five to eight stamens. In the female flower they are often fertile, that is to say, provided with a basifixed anther, often reniform, with marginal cells. The placentas are often pauciovulate, and the ovules ascendent, with the micropyle directed downwards and inwards. The calyx, instead of being gamosepalous and valvate, is composed of leaves very distinctly imbricated. It is the same in *Rawsonia*, closely connecting *Pangieæ* to *Bixeæ* by means of *Oncoba*, the polygamous flowers of which have from four to five sepals, passing gradually to a like number of petals, lined within by a plate almost petaloid, or covered with down, and very numerous stamens with anthers more or less sagittate at the base, and inserted upon a receptacle more or less dilated. The ovary contains from two to five multiovulate placentas, and is surmounted by a style with lobes more or less developed, erect or finally patulous and radiating. Lastly, *Kiggelaria* (figs. 330, 331) has a valvate or scarcely imbricated calyx, anthers only dehiscing for a short distance near the apex, and a fruit which opens with difficulty, or incompletely into a variable number of valves.

Kiggelaria africana.

FIG. 330.
Male flower ($\frac{3}{1}$).

FIG. 331.
Female flower ($\frac{2}{1}$).

VIII. PAPAYA SERIES (Fr., *Papayer*).

The Papayads[1] (figs. 332–338) have polygamous or dicœcious regular flowers. In the male flowers, the convex receptacle bears a

Papaya Carica.

Fig. 332.
Port ($\frac{1}{30}$).

gamosepalous calyx, generally little developed, cut into five imbricated or valvate teeth, and a gamosepalous corolla, generally infun-

[1] *Papaya* T., *Inst.*, 659, t. 441.—Adans., *Fam. des Pl.*, ii. 357.—J., *Gen.*, 399.—Gærtn., *Fruct.*, ii. 191, t. 122.—DC., in *Lamk. Dict.*, v. 2.—Lamk., *Ill.*, t. 821.—A. DC., *Prodr.*, xv. p. i. 414.—H. Bn., in *Adansonia.*, x. 258.—*Carica* L., *Gen.*, n. 1127 (ed. 1, n. 759).—Turp., in *Dict. Sc. Nat.*, Atl., t. 212.—Schnizl., *Iconogr.*, fasc. 7, ic.—Spach, *Suit. à Buffon*, xiii. 314.—End., *Gen.*, n. 5119.—Payer, *Fam. Nat.*, 118.—B. H., *Gen.*, 815, n. 17.

dibuliform or hypocrateriform, with narrow tube and limb divided into five equal lobes.[1] The androceum is formed of ten stamens superposed, five to the divisions of the calyx, and five placed lower, to the lobes of the corolla. They are all inserted towards the throat of the latter, and each formed of a two-celled, introrse anther dehiscing by two longitudinal clefts, and of a filament which varies sometimes in length,[2] sometimes inasmuch as it is free or united to a

Papaya Carica.

Fig. 333.
Male flower.

Fig. 335.
Seed ($\frac{2}{1}$).

Fig. 336.
Long. sect. of seed.

Fig. 334.
Patulous corolla of female flower.

variable distance from the base with the neighbouring filaments.[3] A rudimentary gynæceum, with tapering apex, occupies the bottom of the flower. In the female flowers there is a calyx analogous to that of the male flowers, and a corolla with five free petals, valvate or contorted in the bud. The androceum is totally wanting, or more rarely it is formed of a variable number of hypogynous stamens, little developed but fertile however, like those of the male flowers.[4] The gynæceum, here completely developed, is composed of a free unilocular ovary, surmounted by a style with five branches, more or

[1] When they are contorted in præfloration their two halves are often a little unsymmetrical. The corolla is generally large, white, yellowish, or greenish. In the true *Papaya* (*Eupapaya*) De Candolle described the lobes of the corolla as being constantly "dextrorsum (e centro floris observati) contorti." But Bentham & Hooker say rightly:—"Character ab æstivatione desumptus inter *Papayam* et *Vasconcelliam*, qui ex sententia Candollei optimus est, nobis nullius momenti apparet, num in duabus speciebus flores in eodem specimine invenimus æstivatione sinistrorsum et dextrorsum contorta."

[2] The five oppositipetalous anthers are often almost sessile, the other five having longer filaments. The pollen is ovoidal with three folds; in water it becomes spherical with three papillose bands. (H. Mohl, in *Ann. Sc. Nat.*, sér. 2, iii. 327).

[3] The monadelphia is more or less pronounced in *Jacartia* (Marcgr., *Bras.*, 128, ic.; — A. DC., *Prodr.*, 419;—B. H., *Gen.*, 815, n. 18), sometimes generically distinguished, and whose leaves are always digitate; but which we only make a section of the genus *Papaya*.

[4] Whence it results that the female *Papayas*, which are cultivated far from the male plant, often bear in our greenhouses fruits containing fertile seeds.

less divided and subdivided into branchlets the extremity being stigmatiferous. In the ovary are seen five more or less prominent parietal placentas, bearing an indefinite number of anatropous ovules.[1] The fruit is a berry, the pulp containing numerous seeds. These are formed of thick coats, particularly the middle one,[2] which cover a fleshy albumen, enveloping an axile embryo, with cylindrical radicle and oblong foliaceous cotyledons, digitinerved at the base.

Certain Papayads, distinguished under the name of *Vasconcella*[3] (figs. 337, 338), differ from the preceding, in that their corolla is

Papaya (*Vasconcella*) *quercifolia.*

FIG. 337.
Male inflorescence.

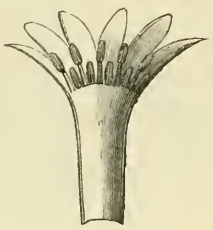

FIG. 338.
Patulous corolla of male flower.

oftener valvate, and their ovary divided to a variable height, into five more or less incomplete lobes, each presenting a placenta upon its dorsal wall.

The Papayads are trees or shrubs of tropical America, of which more than twenty species[4] are known. All their organs contain a milky juice.[5]

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[1] Disposed in two or a greater number of series. They have two envelopes, and long remain cylindrical elongated, phalliform. At the adult age their funicle, which serves to direct the pollen tubes towards the micropyle, often thickens on the face of the latter.

[2] It is often of a suberose consistence, and contains a milky latex; it is enveloped by a membrane often described as an adherent aril. (JACQ. F., *Eclog.*, 101).—J. G. AGARDH, *Theor. Syst. Pl.*, 379.—B. H., *loc. cit.*). The testa is coriaceous, or crustaceous, with exterior surface smooth, rugose, or bristling with prickles.

[3] A. S. H., *Deux Mém. sur les Résédac.*, ii. 13, in *Mém. Soc. Roy. d'Orléans*, i. 12.—ENDL., *Gen.*, n. 5120.—PAYER, *Fam. Nat.*, 119.—*Vasconcellea* A. DC., *Prodr.*, 414. — *Vasconcellia* B. H., *loc. cit.*

[4] JACQ., *Hort. Schœnbr.*, iii. t. 309–311.—JACQ. F., *Eclog.*, t. 68, 69.—AUBL., *Guian.*, ii. t, 346.—VELLOZ., *Fl. Flum.*, x. t. 130–133.—HOOK. & ARN., *Beech. Voy., Bot.*, 425, t. 98.—DESF., in *Ann. Mus.*, i. 273, t. 18 (*Vasconcella*).—PŒPP. & ENDL., *Nov. Gen. et Spec*, ii. t. 182.—WIGHT, *Ill.*, t. 106, 107.—DESC., *Fl. Méd. Ant.*, i. t. 47, 48.—C. GAY, *Fl. Chil.*, ii. 413, t. 25.—A. GRAY, *Amer. Expl. Exp., Bot.*, i. 640.—ERNST, in *Seem. Journ. of Bot.* (1866), 81.—MIQ., *Fl. Ind.-Bat.*, i. 697.—*Bot. Reg.*, t. 459.—*Bot. Mag.*, t. 2898, 2899, 3633.—WALP., *Rep.*, ii. 205; *Ann.*, ii. 649; iv. 868.

[5] It is covered with prickles in the *Jacaratia*, as well as the branches, petioles, &c.

Their trunk is often simple,[1] and their summit bears a crown of alternate leaves, more or less near together, petiolate, exstipulate, with a simple digitinerved limb, more or less cut, or more rarely compound-digitate, with a number of leaves varying from five to twelve. The flowers are axillary, or disposed upon the wood in simple racemes, or in clusters of cymes, without bracts.

IX. TURNERA SERIES.

Turnera[2] (figs. 339–342) has regular flowers generally hermaphrodite. The exterior perianth, or calyx, has the form of a tube,[3] dilating above into a funnel or bell shape, and dividing at this point into oblong plates, linear or lanceolate, disposed in quincuncial præfloration in the bud. The corolla is formed of five petals alternating with the divisions of the calyx. They are most generally inserted near its throat, and are much developed, so as to be represented by large coloured membranous plates,[4] oboval-rounded or spathulate, with a short claw, and they are disposed in contorted præfloration in the bud. But there are certain species in which the petals, little developed, not very brilliant in colour, are reduced to tongues which do not surpass or even attain to the height of the sepals, while they are too narrow to cover or touch each other, even in the bud.[5]

In one of the species, distinguished under the generic name of *Erblichia*,[6] the claw of the petal is crowned by short threads. The androceum is formed of five stamens alternate with the petals, and either inserted on a level with them, or more usually lower down on

[1] Vauquel., in *Ann. Chim.*, xliii. 267.—Holder, in *Mem. Werner. Soc.*, iii. 245.—Pœpp., *loc. cit.*, ii. 60.—Schacht., in *Ann. Sc. Nat.*, sér. 4, viii. 164.

[2] Plum., *Gen.*, 15, t. 12.—L., *Gen.*, n. 376.—Adans., *Fam. des. Pl.*, ii. 244.—J., *Gen.*, 313.—Gærtn., *Fruct.*, i. 366, t. 76.—Poir., *Dict.*, viii. 141; Suppl., v. 374; *Ill.*, t. 212—DC., *Prodr.*, iii. 346.—Turp., in *Dict. Sc. Nat.*, Atl., t. 214.—Spach, *Suit. à Buffon*, vi. 250.—Lindl., *Veg. Kingd.*, 347, t. 239.—Endl., *Gen.*, n. 5056.—Payer, *Fam. Nat.*, 92.—B. H., *Gen.*, 806, n. 1.—Lem. & Dcne., *Tr. Gén.*, 277.—H. Bn., in *Adansonia*, x. 258.—*Pumilea* P. Br., *Jam.*, 188 (ex Adans.).—*Bohadschia* Presl, *Rel. Hænk.*, ii. 98, t. 68.—*Tribolacis* Griseb., *Fl. Brit. W.-Ind.*, 297.—*Triacis* Griseb., *loc. cit.* (ex B. H.).

[3] This tube is probably of the nature of a receptacle, and on this account comparable with *Samyda*. If so, it would be better to say that the sepals are free, or nearly so, and that the true calyx only commences with the insertion of the petals.

[4] Yellow, white, pink, or lilac, with occasionally a basilar spot of blackish purple.

[5] Especially in *T. decipiens* (H. Bn., in *Adansonia*, x. 246), of which we have made the type of a section *Cephalacis*, and whose inflorescence is in capitula.

[6] Seem., see *Her.*, *Bot.*, 130, t. 27.—B. H., *Gen.*, 807, n. 2.

the floral tube. They can descend very low in that way, and their insertion may thus become almost completely hypogynous; this occurs especially in certain African species forming the genus

Turnera cistoides.

FIG. 339.
Floriferous branch.

Wormskioldia.[1] Each stamen is composed of a free filament, linear or flattened, and of an oblong, two-celled, introrse anther, dehiscing by two longitudinal clefts. The gynæceum is free at the bottom of the floral tube, formed of a unilocular ovary, and surmounted by three styles, of which the two anterior are generally simple, very soon bipartite as in *Piriqueta*,[2] with the stigmatiferous apex nearly entire,[3] more generally fimbriate, fan-shaped.[4] Each placenta

[1] SCHUM. & THÖNN., *Beskr.*, i. 165.—ENDL., *Gen.*, n. 5058.—B. H., *Gen.*, 807, n. 3.—*Tricliceras* DC., *Pl. Rar. Jard. Gen.*, 56.— *Schumacheria* SPRENG., *Gen.*, 232, n. 1220 (nec VAHL). — *Streptopetalum* HOCHST., in *Flora* (1841), 665.

[2] AUBL., *Guian.*, i. 298, t. 117.—J., *Gen.*, 295.—DC., *Prodr.*, iii. 348.—ENDL., *Gen.*, n. 5057.—*Burghartia* NECK., *Elem.*, n. 1186.—*Burkardia* SCOP., *Introd.*, n. 1027.

[3] It is especially so in the *Erblichia*.

[4] The divisions are from two to five, or even indefinite in number.

supports one, two or more frequently an indefinite number of ascendent anatropous ovules, with interior and inferior micropyle.[1] The fruit (fig. 341) is an almost globular, ovoid, oblong capsule, or in certain *Wormskioldia*, narrow, much elongated, siliquiform and

Turnera ulmifolia.

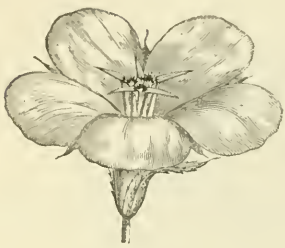

Fig. 340.
Flower.

Fig. 341.
Dehiscent fruit.

Fig. 342.
Seed ($\frac{8}{1}$).

torulose. Its three valves bear on the middle of their internal face a very variable number of seeds (fig. 342), provided with a membranous aril,[2] the coats[3] covering a fleshy albumen, and an almost cylindrical axile embryo, with plano-convex cotyledons. About seventy-five species[4] of the genus are known. They are herbaceous, suffrutescent, or frutescent plants, glabrous or covered with hairs, and their habit and foliage are very variable. The leaves are alternate, sessile or petiolate, simple, entire, dentate, or pinnatifid. Their petiole is accompanied at the base by two lateral stipules, often small, sometimes wanting, and the base of their limb sometimes bears two lateral glands. Their flowers are axillary, solitary, or more rarely united in racemes or cymes, sometimes in capitula (*Cephalacis*), and they are often connate for a variable distance with the petiole of their axile leaf. *Turnera* is principally American, more rarely found in tropical and southern Africa; *Wormskioldia* is entirely of the latter regions.

[1] When they are numerous they are ranged in two rows for each placenta; they have two envelopes, and their umbilical region already presents a slight swelling in the form of a pad, the first rudiment of the aril.

[2] This has most generally the form of a small erect leaf, almost independent of the seed, or partly enveloping it at its base like a sort of cornet. We have seen it springing from the umbilicus.

[3] The testa is crustaceous, or in general pretty regularly foveate.

[4] H. B. K., *Nov. Gen. et Spec.*, vi. 127.—A. S. H., *Fl. Bras. Mer.*, ii. 212, t. 119–124.—Tul., in *Ann. Soc. Nat.*, sér. 5, ix. 322–324 (*Wormskioldia*).—Guillem. & Perr., *Fl. Sen. Tent.*, i. t. 11 (*Wormskioldia*).—Harv. & Sond., *Fl. Cap.*, ii. 599.—Harv., *Thes. Cap.*, t. 140.—Hook., *Icon.*, t. 522.—Kl., in *Pet. Reise. Moss., Bot.*, 146, t. 26 (*Wormskioldia*).—Griseb., *Fl. Brit. W.-Ind.*, 297.—Walp., *Rep.*, ii. 228, 230; v. 782; *Ann.*, ii. 658.

X. COCHLOSPERMUM SERIES.

Cochlospermum[1] (fig. 343) has beautiful hermaphrodite regular flowers, with receptacle slightly convex, bearing five sepals[2] quincuncially imbricated, caducous, and five alternate petals, contorted in præfloration. Higher up are inserted a large number of hypogynous stamens, each formed of a free filament,[3] and an almost

Cochlospermum Gossypium.

Fig. 343.
Flower.

basifixed, elongated anther with two cells,[4] opening inwardly from the apex[5] by an orifice sometimes very short, sometimes a little more elongated and constituted by two short clefts, which circumscribe, in uniting above, a short triangular panel.[6] The gynæceum is superior, composed of a free one-celled ovary, surmounted by a tubular style, with stigmatiferous extremity, entire or slightly dentate. In the ovary, in front of the sepals, are seen five falciform parietal placentas (or only three, the two lateral placentas disappearing), facing each other at their concave edge. Below they generally come in contact, so that the ovary at this level becomes pluri-

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[1] K., *Malvac.*, 6.—Cambess., in *Mém. Mus.*, xvi. 402.—Endl., *Gen.* n. 5405.—Pl., *Sur la Nouv. Fam. des Cochlospermées* (in *Hook. Lond. Journ.*, vi. 306).—B. H., *Gen.*, 124, 971, n. 1.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 78.—H. Bn., in *Adansonia*, x. 259.—*Maximiliana* Mart., in *Flora* (1819), 451.—*Wittelsbachia* Mart. & Zucc., *Nov. Gen. et Spec.*, i. 80, t. 55. — *Azeredia* Arrud. (ex Allem., *Desenh. Arrud.*, c. ic.).

[2] Occasionally four or six.

[3] Sometimes a little longer on one side of the flower than on the other.

[4] Each divided into two cellules in the greater part of their length.

[5] Often surmounted by a small point.

[6] Planchon has distinguished two subgenera: *Diporandra*, the anthers of which open by two pores, and *Eucochlospermum*, where there is only one.

locular. Above they remain more or less separated from each other, so that at this height the axis of the ovary is occupied by a single cavity. Upon the faces of the placentas, and in a very variable extent of their lower part,[1] are seen an indefinite number of anatropous ovules, disposed in two or several series. The fruit is a capsule, with three or five incomplete cells having a very peculiar mode of dehiscence. The endocarp, membranous or like parchment, divides into valves, bearing upon the middle of their internal face seminiferous partitions, at the same time detaching itself from the more exterior layers of the pericarp, the valves of which alternate with its own. The reniform or spiral seeds contain under their coats,[2] the exterior covered with woody hairs of variable length, a fleshy albumen, in the axis of which is found a greenish incurved embryo, with cylindro-conical radicle, and oval foliaceous cotyledons.

Cochlospermum consists of trees, shrubs, or perennial herbs, with tuberous rhizome,[3] filled with a yellow or reddish juice. The leaves are alternate, palmatifid, or digitate. Their flowers are disposed at the summit of the branches, and in the axils of the upper leaves in more or less compound racemes. A dozen species[4] are distinguished in this genus, natives of all the tropical regions of the world.

In certain species of *Cochlospermum* the falciform partitions of the ovary are much elevated, so that below the base of the style there is but a very small cavity corresponding with the axis of the ovary. In one or two species of the Western regions of the two Americas, distinguished under the name of *Amoreuxia*,[5] but which, according to us, only constitute a series in the genus *Cochlospermum*,

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[1] The line according to which the insertion of the ovules ceases above, is often more or less oblique from above downwards, and from within outwards.

[2] We have seen (*Adansonia*, x. 260) that under the superficial coat, covered with hairs, the hard and dusky testa bears at one of its extremities (that which corresponds to the apex of the cotyledons) a circular opening, made as with a punch, and which would be wide open, if the interior membrane, elsewhere soft and pale, did not thicken at this point into a sort of brown cork, which is applied like a plug upon the internal orifice. We have observed the same peculiarity in *Amoreuxia*.

[3] Which must certainly be considered as a woody stem, short, thick-set, and subterraneous, so that the aerial herbaceous axes would only be annual branches.

[4] L., *Syst.*, 517 (*Bombax*). — Burm., *Ind.*, 145 (*Bombax*). — Cav., *Dess.*, v. 297, t. 157 (*Bombax*). — Sonner., *Voy.*, ii. 235, t. 133 (*Bombax*).—A. S. H., *Pl. Us. Bras.*, t. 57; *Fl. Bras. Mer.*, i. 296.—Cambess., in *Mém. Mus.*, xvi. 402.—Wight, in *Hook. Bot. Misc.* Suppl., t. 18.—Wight & Arn., *Prodr.*, i. 87.—Roxb., *Fl. Ind.*, ii. 169.—K., *Syn. Pl. Æquin.*, iii. 214. —H. B. K., *Nov. Gen. et Spec.*, vii. 233.—Guillem. & Perr., *Fl. Sen. Tent.*, i. t. 21.—Oliv., *Fl. Trop. Afr.*, i. 112.—F. Muell., *Fragm.*, i. 71.—Benth., *Fl. Austral.*, i. 105.—Walp., *Ann.*, i. 115; ii. 176; vii. 222.

[5] Sess. & Moç., *Fl. Mexic. ined.* (ex DC., *Prodr.*, ii. 638).—Endl., *Gen.*, n. 6403 (*Rosaceæ*). —Pl., in *Hook. Lond. Journ.*, vi. 140, 306, t. 1. —A. Gray, *Fl. Wright.*, ii. t. 12.—H. Bn., in *Adansonia*, x. 259.—Walp., *Ann.*, iv. 340.

the three partitions are much more elevated and divide the cavity of the ovary into three complete cells. The organization of the flower, leaves, fruit, and seeds is the same; but the superficial coat of the seeds only bears very short thinly-scattered hairs, as in certain species, of *Gossypium* (Fr., *Cotonniers*), on account of which they have been wrongly described as glabrous.

The family of *Bixaceæ* is one which has been formed by links. It was established in 1815 under the name of *Flacourtianeæ*, by L. C. Richard,[1] whose son afterwards showed the identity of the group with the *Bixaceæ* proper. A. L. de Jussieu, in his *Genera*, had confounded with the *Tiliaceæ* those genera of *Bixaceæ* known in his time—that is to say, *Flacourtia*, *Oncoba*, *Bixa*, *Lætia*, and *Banara*. He left in *Incertæ sedis*, *Samyda*, and under the name of *Anavinga*, *Guidonia* (*Casearia*), which he placed somewhere else among the *Cistæ*, under the title of *Piparea*. *Papaya* ought, it appeared to him, to be placed among the *Cucurbitaceæ*; *Turnera* among the *Portulaceæ*, *Ludia* and *Homalium* among the *Rosaceæ*. In 1822, Kunth[2] gave the name of *Bixineæ* to the family, followed closely by De Candolle,[3] who preserved as distinct the Orders of *Flacourtianæ* and *Bixineæ*, admitting in the first, *Ryania*, *Flacourtia*, *Xylosma* (*Romuea*), *Kiggelaria*, *Melicytus*, *Hydnocarpus*, *Erythrospermum*, and in the latter, *Bixa*, *Bonara*, *Lætia*, *Prockia*, *Ludia*, and *Azara*. In 1836, Lindley[4] substituted the name of *Bixineæ* for that of *Bixaceæ*, adopted by Endlicher[5] and by most of his successors. Lindley moreover, in 1846, placed in the same alliance the *Violales*, the *Bixaceæ* proper (*Flacourtiaceæ*[6]), and the *Lacistmeæ*, *Samydaceæ* and *Turneraceæ*.[7] The small alliance of *Papayales*, which in his *Vegetable Kingdom*[8] comes immediately before this, includes the two Orders, *Papayaceæ* and *Pangiaceæ*.[9] To more modern authors it has seemed that these latter

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[1] In *Mém. Mus.*, 1., 366.—Clos., in *Ann. Sc. Nat.* sér. 4, iv. 362; viii. 209.

[2] *Diss. Malvac.*, 17.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 75–94.—R. H., *Gen.*, 122, Ord. 17.

[3] *Prodr.*, i. (1824), 255, 259, Ord. 13, 14.

[4] *Introd.*, ed. 2, 72.

[5] *Gen.*, 917, Ord. 195.—J. G. Agardh, *Theor. Syst Pl.* 255.—H. Bn., in *Adansonia*, x. 248.

[6] *Veg. Kingd.*, 327, Ord. 110.

[7] *Op. cit.*, 326, All. 26.

[8] *Op. cit.*, 320, All. 25.

[9] *Pangiæ* Bl., in *Ann. Sc. Nat.*, sér. 2, ii. (1834), 90; *Rumphia*, iv. 19.—B. H., *Gen.*, 129, trib. 4.—H. Bn., in *Adansonia*, x. 248, 257.—*Pangiacæ* Endl., *Gen.*, 922.—Lindl., *Veg. Kingd.*, 323, Ord. 109.

should form part of the group of *Bixaceæ;* while the *Papayaceæ*[1] have been rejected far from them near to the *Passiflorcæ*, together with most of the *Samydeæ*,[2] *Homalieæ*,[3] *Turnereæ*.[4] We have just proposed to leave the latter definitely in the same family as the *Samydeæ*, from which they appear to us inseparable, as *Papayaceæ* is, we think, from *Pangieæ*. *Cochlospermum*, ascribed by us to *Cistaceæ*,[5] by others to *Ternstræmiaceæ*,[6] has been introduced by Bentham and Hooker into the family of *Bixaceæ*,[7] which (thanks to the separation proposed by Payer, of *Homalieæ* into two secondary series, of which the one with a free gynæceum takes the name of *Calanticeæ*[8]) really includes ten secondary groups, of the general character of which we will give an epitome.

I. Bixeæ.—Flowers generally large, hermaphrodite or polygamous dicœcious. Petals larger than the sepals, or wanting, destitute of appendages or inner scale, imbricated or contorted. Anthers linear or oblong, indefinite in number. Fruit dry or fleshy, dehiscent or indehiscent, generally covered with prominent ribs, tubercles, or prickles. Woody plants, with alternate leaves, and stipules generally small.—(2 genera.)

II. Flacourtieæ.—Flowers generally unisexual, rarely hermaphrodite, apetalous, with convex receptacle (and hypogynous insertion). Anthers usually short, dehiscing by longitudinal clefts.—(7 genera.)

III. Samydeæ.—Flowers generally hermaphrodite, rarely unisexual, with petals nil or little developed, nearly equal and analogous to the sepals. Receptacle more or less pateriform or cupuliform (whence the more or less pronounced perigynous insertion of the

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[1] *Papayaceæ* Ag., *Class.* (1824), 20.—Mart., *Consp.* (1835), 169.—Endl., *Gen.*, 932, Ord. 200.—Lindl., *Veg. Kingd.*, 321, Ord. 108.—B. H., *Gen.*, 815 (*Passiflorearum* trib. 5).—*Caricaceæ* Turp., in *Dict. Sc. Nat.*, Atl. ii. 2, 212.—*Papayeæ* H. Bn., in *Adansonia*, x. 218, 258.

[2] *Samydeæ* Gærtn. f., *Fruct.*, iii. 238.—Vent., in *Mém. Inst.* (1807), 143 (part.).—DC., *Prodr.*, ii. 47, Ord. 58.—Endl., *Gen.*, 917, Ord. 194.—*Samydaceæ* Lindl., *Introd.*, ed. 2, 64; *Veg. Kingd.*, 330, Ord. 112.—B. H., *Gen.*, 794, Ord. 71.

[3] B. H., *Gen.*, 795 (*Samydacearum* trib. 4).—H. Bn., in *Adansonia*, x. 248.—*Homalineæ* R. Br., *Congo*, 438.—DC., *Prodr.*, ii. 53, Ord. 59.—Endl., *Gen.*, 922, Ord. 196.—*Homaliaceæ* Lindl., *Introd.*, ed. 2, 55; *Veg. Kingd.*, 742, Ord. 284.

[4] H. Bn., in *Adansonia*, x. 249, 258.—*Turneraceæ* H. B. K., *Nov. Gen. et Spec.*, vi. 123 (*Loasearum* sect. 2).—DC., *Prodr.*, iii. 345, Ord. 83.—Endl., *Gen.*, 914, Ord. 193.—Lindl., *Introd.*, ed. 2, 150; *Veg. Kingd.*, 347, Ord. 121.—B. H., *Gen.*, 806, Ord. 73.

[5] Lindl., *Veg. Kingd.*, 350.

[6] Endl., *Gen.*, 1017.

[7] *Gen.*, 122, trib. 1. M. Planchon preserves a distinct family of the *Cochlospermeæ* (in *Hook. Lond. Journ.*, v. 294; in *Ann. Sc. Nat.*, sér. 4, xvii. 90, Ord. 13), intermediate to the *Capparidaceæ* and to the *Bixaceæ*.

[8] *Fam. Nat.*, 83.—H. Bn., in *Adansonia*, x. 256.

stamens and perianth). Stamens all fertile, or accompanied by staminodes, interposed or peripheral.—(15 genera.)

IV. Lacistemeæ. — Flowers hermaphrodite, apetalous, amentaceous with one simple fertile stamen.—(1 genus.)

V. Calanticeæ.—Flowers hermaphrodite, provided with petals equal to the sepals or shorter, the same or double in number. Stamens superposed to the petals, sometimes separately, sometimes in phalanges. Gynæceum free, superior.—(3 genera.)

VI. Homalieæ.—Flowers hermaphrodite, with petals and stamens disposed as in *Calanticeæ*, but with a concave obconical receptacle, in the cavity of which the ovary is inserted. Fruit dry, capsular, "adherent."—(2 genera.)

VII. Pangieæ. — Flowers dicœcious, with concave receptacle. Sepals hypogynous, valvate, or imbricated. Petals imbricated, provided within with a blade or glandular plate, free or adhering for a variable distance to their inner face. Stamens definite or indefinite in number. Fruit generally indehiscent, fleshy, or coriaceous, often voluminous, rarely capsular and dehiscent at the apex.—(6 genera.)

VIII. Papayeæ.—Flowers unisexual or polygamous, with convex receptacle. Perianth double. Corolla inappendiculate, dissimilar in the two sexes, tubular below and gamosepalous in the male flowers, polypetalous in the female. Androceum diplostemonous, inserted on the corolla. Gynæceum superior. Fruit fleshy.—(1 genus.)

IX. Turnereæ. — Flowers hermaphrodite. Perianth tubular (receptacle ?). Petals (rarely appendiculate) inserted at the throat and perigynous. Androceum isostemonous. Stamens inserted with the petals (and perigynous), or more or less low until below the ovary (hypogynous). Ovary free, trimerous. Styles distinct, simple or divided at the summit. Fruit capsular. Seeds arillate.—(1 genus.)

X. Cochlospermeæ.—Flowers hermaphrodite, with convex receptacle, diperianthous. Petals developed, inappendiculate, contorted. Stamens hypogynous, equal or unequal, indefinite in number. Anthers linear, opening at the summit by pores or short clefts. Gynæceum free, with partitions more or less incomplete or almost complete. Fruit capsular, with the exocarp separate from the endocarp, and opening into valves alternate with those of the endocarp. Seeds incurved or spiral, piliferous, operculate in front of the summit of the fornicate embryo.—(1 genus.)

The forty genera[1] united in this family include about four hundred and fifty species, all belonging to the warmest regions of the globe. They extend in Africa to the Cape of Good Hope, and are not found farther north in America than Mexico. The family ceases, moreover, at Chili, and at one part or another of Central China and Japan. It is neither represented in Europe, nor in the United States. The two series of *Papayeæ* and *Lacistemeæ* are only represented in America; those of the *Calanticeæ* and *Pangieæ* only in the Old World. This only possesses about a hundred and thirty species of *Bixaceæ;* the other three hundred and twenty species being American. There are only American species in the genera *Bixa, Perdiscus, Lætia, Samyda, Euceræa, Lunania, Tetrathylacium, Ryania, Kuhlia, Banara, Azara, Abatia.* The genus *Osmelia* is peculiar to tropical Asia; *Idesia* to Japan; *Dovyalis, Trimeria, Ludia, Aphloia, Pyramidocarpus, Dissomeria, Asteropeia, Calantica, Byrsanthus, Kiggelaria,* and *Rawsonia* are peculiar to tropical or subtropical Africa, continental or insular; *Streptothamnus,* to Australia. As common to the two Worlds, but more abundant in the New, we find *Oncoba, Xylosma, Guidonia, Homalium, Turnera,* and *Cochlospermum. Flacourtia* and *Scolopia,* natives of the old continent, are found in Asia, Australia, and Africa.

The characters common to all the *Bixaceæ* are not numerous; we can only cite as constant, or nearly so, the woody consistence of the stem,[2] the parietal placentation, the indefinite number of the ovules, the presence of a fleshy albumen. In this, *Bixaceæ* singularly resemble the *Tiliaceæ* and *Ternstræmiaceæ,* whose ovary cells are far from being always complete; and as the præfloration of their calyx is variable, it may be said that they represent the parietal placentation of the *Tiliaceæ* when their calyx is valvate, and of the *Ternstræmiaceæ* when it is imbricated. At the same time, the series with free ovaries have numerous points of contact with the *Cistaceæ* nearly allied to *Cochlospermeæ,* and only differ from them by their

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[1] Besides those which are doubtful, in which is included *Tachibota* (*Guian.*, 287, t. 112) doubtfully ascribed to *Bixacea,* by Endlicher (*Gen.*, n. 5884), and which Schreber (*Gen.*, n. 513) had named *Salmasia,* but which seem separated from this family, according to Benth. & Hooker (*Gen.*, 124). It is perhaps a *Samyda.*

[2] Oliver (*Stem. in Dicot.*, 6) has studied the organization of the wood in *Bixa Orellana,* and has pointed out the thick numerous medullary rays, the woody tissue consisting of elongated cellules little thickened, and often with abrupt extremities. The mass is traversed by finely punctured or radiated vessels, generally two or three radial.

orthotropous or incompletely anatropous ovules, and by their non-fornicate seeds.[1] They are very nearly allied also to what we consider *Turnereæ*, having the same corolla and mode of placentation, and are only separated by the mode of insertion of the corolla. *Violaceæ* having regular flowers, among which *Tetrathylacium* has been placed, and including the very nearly allied genus *Leonia*, are only distinguished from the *Bixaceæ* with oligandrous flowers, by the insertion of the stamens in the perigynous types, or by the arrangement of the pieces of the androceum in the types with hypogynous insertion.[2] The *Passifloraceæ*, to which *Ryania* has been attached, is distinguished from *Bixaceæ* by the presence of the crown of appendages accompanying the perianth, and it is on this account that we have separated from it the *Papayeæ*, which have not this character, and which LINDLEY has shown to have a great affinity with *Pangieæ*.

Some *Capparidaceæ* analogous to *Bixaceæ* are distinctly separated from it by their exalbuminous seeds. We have already remarked[3] the affinity of *Bixaceæ* with certain groups having usually distinct carpels, and, moreover, very analogous by the rest of their organization. The species of *Oncoba*, principally those of the section *Mayna*, seem to represent the parietal mode of placentation of *Magnoliaceæ*, to which they have sometimes been ascribed. *Camella*, and *Erythrospermum* have been placed close beside the *Bixaceæ*, or even among them, because this differential character in the placentation no longer exists among them. To distinguish them, they have only the characters drawn from the organization of the perianth and androceum. *Cochlospermum* and *Turnereæ* seem to be forms of the parietal placentation of *Wormia* and *Acrotrema*, and by the union of their carpels, to be to the latter what the *Cistaceæ* is to *Hibbertieæ*, *Monodoreæ* to *Anonaceæ*, *Papaveraceæ* to *Ranunculaceæ*, *Nymphæeæ* (Water lilies) to *Nelumbeæ* and *Cabombeæ*, and *Berberidopsis* to the other *Berberidaceæ*.

The number of useful species[4] is considerable, and their properties

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[1] See *Adansonia*, x. 258.

[2] "*Violarieæ* cæt. vald. affin. differ. a *Bixineis* oligandris antheris circa ovar. connivent. connatisve." (B. H., *Gen.*, 123.)

[3] See *Hist. des Plantes*, i. 123.

[4] ENDL., *Enchirid.*, 477, 479.—LINDL., *Veg. Kingd.*, 328, 331; *Fl. Med.*, 101, 111.—ROSENTH., *Syn. Pl. Diaphor.*, 662, 1113.

are far from being uniform. The Anatto[1] (figs. 288–296) is especially celebrated as a tinctorial plant. Its seeds, crushed and diluted with warm water, give a colouring matter contained in their outer coat, and forming with it a residuum which ferments, and is dried in cakes or paste. Stuffs, wax, butter, and chocolate are coloured with it. The Caribbees sometimes use it for staining the skin. It is also a purgative substance; it is prized as a remedy for dysentery in warm countries.[2] *Cochlospermum* also contains a yellow or red colouring matter; it is contained in the soft tunica interior to the testa of their seeds; and in *C. tinctorium*[3] of Senegal it is contained in the stock, which is also considered as an amenagogue. In Brazil *C. insigne*[4] is prescribed in cases of internal injury from falls or blows; it is also employed to draw abscesses. In India *C. gossypium*[5] (fig. 343) is said to produce the gum *Kuteera*, called also wrongly G. Bassora, analogous to G. tragacanth, but which is converted by contact with water into a "transparent jelly, the parts of which have no adherence with each other."[6] The milky juice which is met with in most of the organs of the Papayads has very active properties. The fruit of various cultivated varieties of *Papaya Carica*[7] (figs. 332–336) is alimentary. It is not much relished by most Europeans in a raw state, but they eat it freely when cooked and treated in various ways. In the colonies it is sometimes preserved with sugar. But before maturity, it is filled with an irritant milk, which by chance was discovered to be a powerful vermifuge. Its

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[1] *Bixa Orellana* L., *Spec.* 730.—DC., *Prodr.*, i. 259, n. 1.—*Bot. Mag.*, t. 1456.—Guib., *Drog. Simpl.*, éd. 6, iii. 668, fig. 751.—Rév., in *Fl. Méd. du* xix^e^ *Siècle*, iii. 224, t. 22.—Tr., in *Bull. Soc. Bot. de Fr.*, v. 366.—*B. americana* Poir., *Dict.*, vi. 229 (vugl. *Urucu, Orleans, Arnotto*; in Colombia, *Onoto Achote*).

[2] The seed contains bixine and orelline (Chevreul). *Bixa Urucurana* W. (*Enum.*, 565), of Brazil and *sphærocarpa*, Tr. (*loc. cit.*, 369), of Columbia, are said to possess the same properties.

[3] Rich., Guillem. & Perr., *Fl. Sen. Tent.*, i. 99, t. 21.—Oliv., *Fl. Trop. Afr.*, i. 113.—*C. Planchoni* Hook. f., *Niger*, 263 (vulg. *Fayar*).

[4] A. S. H., *Pl. Us. Bras.*, n. 57.—Endl., *Bot. Med.*, 119.—Rosenth., *op cit.*, 737.—*Wittelsbachia insignis* Mart. & Zucc., *Nov. Gen. et Spec.*, i. 84, t. 55.—*Maximiliana regia* Mart., *in Flora* (1819), 452 (vulg. *Butua do curvo*).

[5] DC., *Prodr.*, i. 527, n. 1.—Wight & Arn., *Prodr.*, i. 87.—Wight, in *Hook. Bot. Misc.*, ii. 357, t. 16.—*Bombax Gossypium* L., *Syst.*, 517. — Cav., *Diss.*, v. 297, t. 157, Sonner., *Voy. aux Ind. Or. et à la Chine*, ii. (1782) t. 133.—Roxb., *Fl. Ind.*, ii. 169.—*B. Congo* Burm., *Ind.*, 145.—*Xylon* L., *Fl. Zeyl.*, 99, n. 222 ex Pl.).

[6] Guib., *Drog. Simpl.*, éd. 6, iii. 452, 628.

[7] Gærtn., *Fruct.*, ii. (1791), t. 122.—*P. vulgaris* DC., in *Lamk. Dict.* v. (1804), 2.—Desc., *Fl. Med. Ant.*, i. t. 47, 48.—A. DC., *Prodr.*, xv. sect. i. 414, n. 1.—*P. sativa*, Tuss., *Fl. Ant.*, iii. 45, t. 10, 11.—*P. orientalis*, Col., in *Hern. Thes.*, 870, ic.—*Papaya* Rumph, *Herb. Amboin.*, i. t. 50.—Hugh., *Barbad.*, t. 14, 15.—*Carica Papaya* L., *Spec.*, 1466 (part.)—Wight, *Ill.*, t. 106, 107.—Lindl., in *Bot. Reg.*, t. 459; *Fl. Med.*, 107; *Veg. Kingd.*, 321, fig. 221, 222.—Hook., in *Bot. Mag.*, t. 2898, 2899.—Roxb., *Fl. Ind.*, iii. 824.—Guib., *Drog. Simpl.*, éd. 6, iii. 268, fig. 639.—Endl., *Enchirid.*, 487.—Rosenth., *op. cit.*, 669 (vulg. *Papaw, Arbre à Melons* in the Antilles). The specific name of Gærtner has the priority with him.

internal application is said to be a cure for tænia, and other intestinal worms. It is bitter without acridity, and is so rich in albuminous substances, that VAUQUELIN[1] compares it to blood deprived of its colouring matter. The pulverized seeds have also vermicidal qualities; which may perhaps be explained by their containing the same milky juice as the other organs. It is said that a few drops of this latex in water will give it the property of rapidly making meat tender when too fresh, or the animal too old; and that the same result is obtained by wrapping the meat during one night in a leaf of the Papaya. WIGHT has remarked, that the seed, when masticated, has the flavour of the nasturtium. The root has the smell of dried radishes. The negroes make gutters of the stem to receive the rain water, and use the leaves to soap linen. The pulp of the ripe fruit, employed as a cosmetic, is said to remove sunburn. In the Moluccas confections are made of the male flower. Another species of the same genus, *P. digitata*,[2] of northern Brazil, is considered a deadly poison, as terrible, it is said, as the Upas of Java. Its latex burns the skin that comes in contact with it, and produces blisters. The male flowers have a repulsive excremental odour. The fruit is inodorous and insipid; but most animals refuse to touch it.

On the contrary, the fruits of *Papaya cauliflora*,[3] *dodecaphylla*,[4] *Mamaya*, *microcarpa*,[5] *nana*,[6] and *pyriformis*,[7] are said to be edible. *P. quercifolia*[8] (figs. 337, 338), is the *Jacamatchiha* of the Guaranis Indians. The fruit of several Oncobas is also edible; the inner pulp of that of *O. spinosa*[9] is also eaten. In *Flacourtia* the entire berry is fleshy and edible, especially in *F. sapida*,[10] *sepiaria*,[11] *iner-*

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[1] In *Ann. Chim.*, xliii. 271.

[2] *Carica digitata* PŒPP. & ENDL., *Nov. Gen. et Spec.*, ii. 260.—*Jacaratia spinosa*, var. *digitata* A. DC., *Prodr.*, *loc. cit.*, 419, n. 1 (vulg. *Chamburu*).

[3] POIR., *Dict.*, Suppl., iv. 296.—*Carica cauliflora* JACQ., *Hort. Schœnbr.*, iii. 33, t. 311.—*Vasconcellea cauliflora* A. DC., *Prodr.*, *loc. cit.*, 415, n. 1.

[4] *Carica dodecaphylla* VELL., *Fl. Flum.*, x. t. 132.—*Jacaratia dodecaphylla* A. DC., *Prodr.*, 420, n. 3.

[5] POIR., *Dict.*, Suppl., iv. 296.—*Carica microcarpa* JACQ., *Hort. Schœnbr.*, iii. t. 309, 310.—*Vasconcellea microcarpa* A. DC., *Prodr.*, 418, n. 13.

[6] A. DC., *Prodr.*, 415, n. 3.—*Carica nana* BENTH., *Pl. Hartweg.*, 288.

[7] *Carica pyriformis* HOOK. & ARN., in *Bot. Misc.*, iii. 325 (nec W.).—C. GAY, *Fl. Chil.*, ii. 413, t. 25.—*Vasconcella chilensis* PL., in *Ann. Sc. Nat.*, sér. 4, ii. 259.

[8] *Vasconcella quercifolia* A. S. H., *Deux. Mém. Réséd.*, 12.—A. DC., *Prodr.*, 416, n. 5 (vulg. *Umbuzeiro* à Rio-Grande do Sul).

[9] FORSK., *Ægypt.-Arab.*, 103.—LAMK., *Ill.*, t. 471.—A. RICH., *Fl. Sen. Tent.*, i. 32, t. 10.—OLIV., *Fl. Trop. Afr.*, i. 115.—*O. monacantha* STEUD.—*Lundia monacantha* SCHUM. & THÖNN., *Beskr.*, 231.

[10] ROXB., *Pl. Corom.*, i. 49, t. 69; *Fl. Ind.*, iii. 834.—DC., *Prodr.*, i. 256, n. 2.—WIGHT & ARN., *Prodr.*, 29.—BL., *Bijdr.*, i. 55.—CLOS, in *Ann. Sc. Nat.*, sér. 4, vii. n. 7.

[11] ROXB., *loc. cit.*, 48, t. 68.—DC., *Prodr.*, n. 4.—CLOS, *loc. cit.*, n. 6.

mis,[1] and in *F. Ramontchi*,[2] or Plumtree of Madagascar. The root of *F. sepiaria* passes as being alexipharmic in India, and in the same country the young shoots of *F. Cataphracta*[3] (figs. 297–300) are eaten as tonics, stomachics, and astringents. *Lætia apetala* and *resinosa* are considered as purgative in the Antilles, and give a kind of sandarac having drastic properties.[4] In the Mauritius, *Aphloia theiformis*[5] has a bark which serves the same purpose as ipecacuanha. The *Acomæ*, especially *Homalium racemosum*[6] (figs. 322–325) have an astringent root, which is used in Guiana as antigonorrhetic. *Turnera opifera* MART., is also an astringent; it is prescribed in Brazil for dyspepsia. *T. ulmifolia* L., and *angustifolia* CURT.,[7] are employed in America as tonics and expectorants. The *Samydeæ* are also often used as astringents: principally at Para, *Guidonia adstringens*,[8] which is used to cicatrize ulcers, and has besides a certain acridity; in Guiana, *G. ovata*,[9] the bark of which is bitter, the leaves used in preparing baths for the treatment of rheumatism, and the fruit, said to have diuretic properties; in central Brazil, *G. ulmifolia*,[10] which is applied to wounds, is also employed in the treatment of serpent bites, and used internally in cases of nausea; *G. Lingua*,[11] which has the reputation of curing malignant fevers, and inward inflammation; in India, *G. esculenta*,[12] of the Circar Mountains, which has a bitter, purgative root, and edible leaves. The *Pangieæ*, so nearly allied to the Papayads by their organization, are still more

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[1] ROXB., *op. cit.*, iii. 16; *Fl. Ind.*, iii. 834.—JACK, in *Hook. Bot. Misc.*, i. 289. — DC., *Prodr.*, n. 2.—MOON, *Cat. Pl. Ceyl*, 70.—CLOS, *loc. cit.*, 216.

[2] LHÉR., *Stirp.*, 59, t. 30, 31.—LAMK., *Ill.*, t. 826.—DC., *Prodr.*, n. 1.—CLOS, *loc. cit.*, n. 8.—OLIV., *Pl. Trop. Afr.*, i. 120.—*Stigmarota africana* LOUR., *Fl. Cochinch.* (ed. 1790), 634. —*Atamoton* FLAC., *Hist. Madag.*, 124.

[3] ROXB., ex W., *Spec.*, iv. 830; *Fl. Ind.*, iii. 834.—DC., *Prodr.*, n. 5.—CLOS, *loc. cit.*, 216, n. 2.—*Stigmarota Jongomas* LOUR., *loc. cit.*—*Roumea Jangomas* SPRENG., *Syst.*, ii. 632.

[4] *Xylosma orbiculatum* FORST., or *Myroxylon orbiculatum* FORST. (*Char. Gen.*, 63), owes its name to its balsamic odour, which is said to be rather agreeable.

[5] BENN., *Pl. Jav. Rar.*, 192.—*Neumannia theaformis* A. RICH., *Fl. Cub.*, 96, not.—CLOS, in *Ann. Sc. Nat.*, sér. 4, viii. 271, 273.—H. BN., in *Dict. Encycl. Sc. Méd.*, v. 644.—*Prockia theæformis* W., *Spec.*, ii. 1214.—DC., *Prodr.*, i. 261, n. 5.—*Ludia heterophylla* BORY, *Voy.*, ii. 115, t. 24.

[6] JACQ., *Amer.*, 170, t. 183, fig. 72.—SW., *Fl. Ind. Occ.*, 989, t. 17.—LAMK., *Ill.*, t. 483, fig. 2.—DC., *Prodr.*, ii. 53, n. 1.—TURP., in *Dict. Sc. Nat.*, Atl., t. 244.—ROSENTH., *op. cit.*, 666.— ? *Racoubea guianensis* AUBL., *Guian.*, ii. 590, t. 236.

[7] ROSENTH., *op. cit.*, 662.

[8] *Casearia adstringens* MART., ex ROSENTH., *op. cit.*, 663.

[9] *Anavinga ovata* LAMK., *Dict.*, i. 148.—*Anavinga* RHEED., *Hort. Malab.*, iv. t. 49.—*Casearia ovata* W., *Spec.*, ii. (1799), 629.—DC., *Prodr.*, iii. 49, n. 5. — *C. Anavinga* PERS., *Syn.*, i. 485 (1805).—ROSENTH., *op. cit.*, 663.

[10] *Casearia ulmifolia* VAHL. (ex VENT., *Ch. de Pl.*, n. 47, not.). — DC., *Prodr.*, n. 13.—A. S. H., *Fl. Bras. Mer.*, ii. 233.—LINDL., *Fl. Med.*, 104 (vulg. *Marmeleiro do mato*).

[11] MART., ex A. S. H., *loc. cit.*, 236 (vulg. *Cha de frade, Lingua de fin*).

[12] *Casearia esculenta* ROXB., *Cat. Hort. Calc.*, 99.—LINDL., *Veg. Kingd.*, 331 (vulg. *Garugoodoo*).

closely so by their properties. *P. edule*[1] (figs. 327–329), wild in Java, is cultivated in the Moluccas, and all the Indian Archipelago. According to Blume,[2] its juice contains an alkaloid analogous to menispermine, and the plant contains an extractive and viscous substance. All its parts are considered in Java as anthelmintic. The bark, leaves, fruit, and seeds are narcotic; all its parts produce in man cephalalgia, somnolence, nausea, and a kind of intoxication and insanity which may terminate in death. The plant is used to poison fish, being thrown into water-courses for this purpose. Cattle which eat its leaves generally die. The extracted juice of the leaves is used in the treatment of chronic cutaneous affections. At Amboyna, the seeds, cut or crushed, are prepared with cold water, or macerated for a long time to extract their noxious qualities. The kernel may then be eaten, and a large quantity of oil is extracted from it, which is used in frying, and in preparing food. Even then it purges those persons who are not accustomed to it. The other *Pangieæ* have analogous properties. *Hydnocarpus venenata*[3] has a very dangerous, poisonous fruit, which is fatal to man, and is used in Ceylon to poison rivers; but the fish which are procured in this way cause terrible accidents. *Trichadenia zeylanica*[4] is used in the treatment of the cutaneous affections of children. *Gynocardia odorata*[5] is also employed in India for chronic skin diseases. The seeds, stripped of their coats, are crushed or ground with butter, and applied topically three or four times a day to the sores. The oil extracted from the seeds is emetic; it is used in the treatment of herpetic, syphilitic, and scrofulous affections. Some *Bixaceæ* furnish a useful wood: in Chili, *Azara microphylla*,[6] said to furnish the *Chinchin* wood; in Java, *Pangium edule*, the stems of which are very hard; in America, the Anatto, logs of which are used for firing, or by wheelwrights, as those of *Homalium* are in Guiana and the Antilles.

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[1] See p. 289, note 1.

[2] *Rumphia*, iv. 19.—Lindl., *Veg. Kingd.*, 323.—Rosenth., *op. cit.*, 665 (vulg. *Pangi*).

[3] Gærtn., *Fruct.*, i. 288, t. 60, fig. 3 (1788).—Endl., *Enchirid.*, 480.—Lindl., *Veg. Kingd.*, 323; *Fl. Med.*, 109.—Rosenth., *op. cit.*, 665.—? *H. inebrians* Vahl, *Symb.*, iii. (1794), 100.—DC., *Prodr.*, i. 257.

[4] Thw., *Enum. Pl. Zeyl.*, 19.

[5] See p. 325, note 2.—Lindl., *Veg. Kingd.*, 323; *Fl. Med.*, 109 (vulg. *Chaulmoogra*, *Petarkura*).

[6] Phil., ex Rosenth., *op. cit.*, 664. According to M. C. Gay (*Fl. Chil.*, i. 192), Chilian *Azaras* have perfumed flowers, whence the common name of *Aromo*. They are used for ornament. Several species are cultivated in our greenhouses. Most of them are still called *Liben*, and have a wood of rather a bad quality.

GENERA.

I. BIXEÆ.

1. **Bixa** L.—Flowers hermaphrodite regular; receptacle shortly convex. Sepals 5, imbricated, and petals same in number, alternate, contorto-imbricated, deciduous. Stamens ∞; filaments inserted under gynæceum, free or polyadelphous at base; anthers extrorse, 2-locular, induplicate at middle, at the same place dehiscing by short clefts (falsely terminal). Germen free, 1-locular; style elongated, in bud recurved, tubular, apex stigmatiferous very obtuse 2-crenate; placentas parietal 2, but little prominent; ovules in each ∞, 2–∞-seriate ascending, anatropous; micropyle extorse lateral and inferior. Fruit capsular, densely echinate-setose or more rarely glabrous, laterally 2-valved; valves thick seminiferous inwardly at middle; endocarp separating. Seeds ∞, obovoid; apex of funicle dilated in small 2-lobed aril; outer coat subfleshy suberose-granulate; chalaza orbicular, finally depressed; albumen fleshy; cotyledons of axile embryo foliaceous wide, often incurved.—Small trees (abounding in red or yellow juice); leaves alternate petiolate digitinerved; stipules 2, lateral, caducous; flowers in terminal racemose cymes; pedicels under calyx often 5-glandular (*Tropical America*). See p. 273.

2. **Oncoba** Forsk.[1]—Flowers polygamous, monœcious or diœcious. Sepals 3–5, and petals same in number, of which 4–10 are larger, esquamate; all much imbricated in præfloration. Stamens ∞, inserted on more or less thickened receptacle; filaments free; anthers linear, more rarely oblong or abbreviate, apex muticous or apiculate with more or less produced connective; cells extrorse longitudinally rimose. Germen free, 1-locular; placentas parietal 2–10, ∞-ovulate;

[1] *Fl. Æg.-arab.*, 103 (1775).—J., *Gen.*, 292.—Poir., *Dict.*, vi. 210; *Ill.*, t. 471.—Spach, *Suit. à Buffon*, vi. 115.—Endl., *Gen.*, n. 5067.—Pl., in *Hook. Lond. Journ.*, v. 295.—Payer, *Fam. Nat.*, 111.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 80.—B. H., *Gen.*, 125, 971, n. 4.—Oliv., in *Journ. Linn. Soc.*, ix. 172.—H. Bn., in *Adansonia*, x. 249.—*Lundia* Schum. & Thönn., *Beskr.*, 231 (nec DC., nec Puer.).—*Heptaca* Lour., *Fl. Coch.*, ed. ulyssip. (1790), 657.—*Ventenatia* Pal. Beauv., *Fl. Ow. et Ben.*, i. 29, t. 17 (nec Sm.).—Cambess., in *Mém. Mus.*, xvi. 409.—Endl., *Gen.*, n. 5402.—*Xylotheca* Hochst., in *Flora* (1843), 69.—*Chlanis* Kl., in *Pet. Mossamb., Bot.*, 144.

style simple, apex stigmatiferous not thickened or scarcely so, subentire, or very shortly denticulate (*Mayna*[1]), sometimes slightly lobed or lobes stronger ascending or radiated, separate or peltate coalescing; 3–7-fid; lobes entire or more or less laciniate (*Carpotroche*[2]), more rarely much ramified (*Dendrostylis*[3]). Fruit subbaccate, more or less coriaceous and finally ligneous, smooth (*Euoncoba*), sulcate or marked with elevated ribs, sometimes echinate, tuberculate or muricate (*Mayna*), more rarely longitudinally ∞-winged; wings tuberculate (*Carpotroche*), sometimes submembranous crested (*Grandidiera*[4]); pericarp more rarely outwardly much echinate (*Dendrostylis*), usually indehiscent, sometimes with difficulty dehiscing or in valves. Seed ∞ of various forms; testa crustaceous, sometimes outwardly more or less pulpous; albumen fleshy; embryo (sometimes coloured) straight or incurved cotyledons subovate foliaceous.—Trees or shrubs unarmed or armed with axillary spines, glabrous or pubescent; leaves alternate, entire crenate, or serrate; stipules linear, small or 0; flowers[5] solitary, terminal or axillary, sometimes in axillary racemes, more rarely growing from wood of trunk or one year-old branches, lateral (*All Tropical Regions*[6]).

II. FLACOURTIEÆ.

3. **Flacourtia** Commers.—Flowers diœcious or polygamous apetalous; sepals 4, 5, often squamiform ciliate, much imbricated, sometimes in female flower very small or slightly bractiform. Disk glandular annular more or less thick, entire or 4, 5-lobed. Stamens ∞ (in female flower 0, or sterile), inserted in more or less depressed disk of receptacle; filaments free; anthers extrorse, 2-locular, after-

[1] Aubl., *Guian.* (1775), 921, t. 352 (nec Radd.).—J., *Gen.*, 281.—Lamk., *Ill.*, t. 491.—DC., *Prodr.*, i. 79.—Endl., *Gen.*, n. 4734.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 80.—Oliv., in *Journ. Linn. Soc.*, ix. 172.—*Lindackeria* Presl, *Rel. Hœnk.*, ii. 89, t. 65.—Endl., *Gen.*, n. 5064.

[2] Endl., *Gen.*, n. 5066.—*Mayna* Radd., *Pl. Nov. Bras.*, 23 (nec Aubl.).

[3] Karst. & Tr., in *Linnæa*, xxviii. 431.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 82.—B. H., *Gen.*, 125, n. 7.

[4] Jaub., in *Bull. Soc. Bot. de Fr.*, xii. 467.—Oliv., *Fl. Trop. Afr.*, i. 119.—H. Bn., in *Adansonia*, x. 250.

[5] Large, handsome, or ordinary, more rarely small, whitish, or yellow.

[6] Spec. about 25, of which 15 are American. Pœpp. & Endl., *Nov. Gen. et Spec.*, iii. 63, t. 270 (*Lindackeria*), 64, t. 271 (*Mayna*).—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 262 (*Mayna*).—Harv. & Sond., *Fl. Cap.*, i. 66.—Guillem. & Perr., *Fl. Sen. Tent.*, i. t. 10.—Sieb. & Zucc., *Pl. Nov. Fasc.*, ii. t. 5 (*Mayna*).—A. Gray, *Amer. Expl. Exp., Bot.*, i. 72 (*Carpotroche*).—Oliv., *Fl. Trop. Afr.*, i. 114.—Karst., *Fl. Columb.*, ii. p. ii. t. 106 (*Lindackeria*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 94 (*Mayna*), 95 (*Dendrostylis*).—Walp., *Ann.*, vii. 223 (*Chlanis*, *Mayna*), 224 (*Dendrostylis*).

wards versatile, rimose. Germen (in male flower rudimentary or usually 0) free, falsely 2–∞-locular; styles 2–∞, separate or connate at base to greater or less height, apex stigmatiferous blunt or 2-lobed; ovules in internal angle of cell 2–∞, descending; micropyle extorse superior. Fruit drupaceous; endocarp in putamen 2–∞, seeds separate indurated. Seeds often obovoid; testa subcoriaceous; embryo albuminous, cotyledons suborbiculate.—Trees or shrubs, often spinescent; leaves alternate, dentate or serrate; petiole articulated at base; stipules very small; flowers small in small racemes or glomerules axillary and terminal, simple or compound, sometimes subumbellate (*Asia, Africa, and Warm Australia*). See p. 276.

4. **Xylosma** Forst.[1]—Flowers (nearly of *Flacourtia*) dicœcious or sometimes polygamous; receptacle shortly conical. Sepals 4–6, sometimes squamiform, often ciliate, imbricated. Disk within calyx glandular-fleshy unequally lobed. Stamens ∞, sometimes few, within disk; filaments free, usually finally exserted; anthers extrorse, finally often versatile; cells longitudinally rimose. Germen (in male flower 0) within disk free (more rarely surrounded by a few staminodes), 1-locular; style subentire or divided into 2–6 branches to a greater or less length, apex dilated stigmatiferous; placentas parietal 2–6, alternating with style branches, ovules in each placenta 1, 2, or few, either all ascending; micropyle (obturate) introrse inferior; or 1, 2, superior, descending. Berry small, indehiscent; seeds 1, 2, or few; testa crustaceous; embryo albuminous; cotyledons wide.—Trees or shrubs,[2] often spinescent; leaves alternate, dentate, or more rarely entire, articulate at base; stipules small; flowers[3] growing on the wood or glomerate at axils or in short racemose cymes; pedicel slender, sometimes articulated[4] (*All Tropical and Subtropical Regions*[5]).

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[1] *Prodr.*, 72.—Lamk., *Ill.*, t. 827.—Poir., *Dict.*, viii. 817.—Endl., *Gen.*, n. 5081.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 127.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 86.—B. H., *Gen.*, 128, n. 19.—*Myroxylon* Forst., *Char. Gen.*, 125, t. 63 (nec L. f.).—*Hisingera* Hellen., in *Act. Holm.* (1792), 32, t. 2.—Endl., *Gen.*, n. 5815.—Clos, *loc. cit.*, 220.—*Bessera* Spreng., *Pl. Pugill.*, ii. 90 (ex Endl.).—*Roumea* Poit., in *Mém. Mus.*, i. 62, t. 4.—*Cræpaloprumnon* Karst., *Pl. Fl. Colomb.*, 123, t. 161, 162.

[2] Wood sometimes odoriferous.

[3] Small, filaments sometimes purple.

[4] Plants in gardens falsely parthenogenesic. (See *Adansonia*, v. 63).

[5] Spec. ad 25. H. B. K., *Nov. Gen. et Spec.*, vii. t. 654 (*Flacourtia*).—Poit., in *Mém. Mus.*, i. 62, t. 4 (*Roumea*).—Sieb. & Zucc., *Fl. Jap.*, t. 88 (*Hisingera*).—Miq., *Fl. Ind.-Bat.*, i. p. ii. 105.—A. Gray, *Amer. Expl. Exp., Bot.*, i. 76.—Walp., *Ann.*, iv. 108; vii. 229, 230 (*Hisingera, Cræpaloprumnon*).

5. **Dovyalis** F. Mey.[1]—Flowers diœcious apetalous, 4–8-merous. Sepals valvate or scarcely imbricated, usually thick. Stamens ∞; receptacle more or less depressed, sometimes subcupulate, between insertion more or less produced in glandules entire or 2-lobed; filaments free; anthers extrorse, 2-locular, 2-rimose. Germen (in male flower 0) surrounded by base of unequally lobed disk[2] free, 1-locular; placentas parietal 2–5; styles same in number, more or less dilated at apex stigmatiferous; ovules on each placenta 1, or rarely 2 (*Eudovyalis*), oftener 2–6 (*Aberia*[3]), descending; micropyle introrse superior. Berry oligospermous, interior pulpous. Seeds outwardly glabrous or oftener villous; testa coriaceous; embryo albuminous; cotyledons wide.—Trees or shrubs, sometimes spinescent; leaves alternate, articulated at base, entire or crenate, penninerved or sub-3-penninerved; stipules very small or 0; flowers axillary or terminal; female solitary or in very few-flowered cymes; male few shortly racemose-cymes (*South and Eastern Africa and Zeylania*[4]).

6. **Trimeria** Harv.[5]—Flowers diœcious, 4, 5-merous or oftener 3-merous; sepals scarcely imbricated and petals same in number, alternate, larger, imbricated. Glandules 3–5, alternipetalous; stamens ∞, often few, exterior; filaments free, finally exserted; anthers extrorse, short, rimose. Stamens in female flower 0. Germen free (in male flower often small, barren), 1-locular; styles 3, apex stigmatiferous obtuse; placentas same in number, parietal; ovules on each placenta 1, 2, descending; micropyle introrse superior. Capsule 3-valved; valves seminiferous at middle.—Tree or shrubs; leaves alternate serrate, base 3–∞-nerved; flowers small, in spikes, axillary racemes with single bracts, 1-bracteolate, 2-nate or ∞, glomerate (*South America*[6]).

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[1] Ex Arn., in *Hook. Journ.*, iii. (1841), 251.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 233.—B. H., *Gen.* 128, n. 20.—H. Bn., in *Adansonia*, x. 251.

[2] Staminodes sometimes hypogynous 1-∞, or sterile (H. Bn., in *Adansonia*, v. 62), or sometimes as it seems fertile; whence fertile seeds are derived without contact of male and female flowers (T. Anderson, in *Journ. Linn. Soc.*, vii. 57), very similar to false parthenogenesis of *Xylosma*.

[3] Hochst., in *Flora* (1844), *Beil.*, 2.—Clos, in *Ann., Sc. Nat.*, sér. 4, viii. 235.—B. H., *Gen.*, 128, n. 21.

[4] Spec. 7, of which 6 are African. A. Rich., *Fl. Abyss. Tent.*, i. t. 8 (*Roumea*).—Harv. & Sond., *Fl. Cap.*, i. 69, 70 (*Aberia*).—Tul., in *Ann. Sc. Nat.*, sér. 5, ix. 339.—Walp., *Ann.*, ii. 62; vii. 231.

[5] *Gen. of S.-Afric. Pl.*, 417.—Endl., *Gen.*, n. 5089[1].—B. H., *Gen.*, 129, n. 22.—*Monospora* Hochst., in *Flora* (1844) *Beil.*, 3.—Endl., *Gen.*, n. 5789[1], 5092[2].—*Renardia* Turcz., in *Bull. Mosc.*, (1858), i. 466.

[6] Spec. 2. Hook., *Icon.*, t. 481 (*Antidesma*).—Harv. & Sond., *Fl. Cap.*, i. 68.—Walp., *Rep.*, v. 47 (*Monospora*); *Ann.*, vii. 232.

7. **Peridiscus** Benth.[1]—Flowers hermaphrodite, apetalous; sepals 4, 5, unequal, subvalvate, finally patent-reflexed. Stamens ∞, hypogynous inserted round base of disk; filaments adpressed below to grooves, incurved at apex, finally patent; exterior sometimes thicker; anthers suborbicular introrse, rimose at margin. Germen orbicular-depressed, 1-locular, all round nearly to middle thickened in annular vertical sulcate disk; styles 3, 4, short, distinct, tapering at apex; ovules 6–8, inserted at apex of cells pendulous; micropyle extrorse superior. "Young fruit obovoid fleshy."—A lofty tree; leaves large, integerrimus coriaceous lucid; flowers small in simple racemes, sometimes umbelliferous, fasciculate at old nodes of small branches. (*North Brazil*[2]).

8. **Lætia** Lœfl.[3]—Flowers hermaphrodite apetalous; receptacle rather wide. Sepals 4, 5, wide subpetaloid, much imbricated, finally often reflexed. Stamens 10–15 (*Casinga*[4]), or sometimes ∞, hypogynous on eglandular disk, or with exterior subperigynous insertion; filaments free; anthers introrse short or ovoid. Germen free, 1-locular; style simple, apex stigmatiferous, capitate, sometimes wide sessile (*Thiodia*[5]), or shortly 3-lobed. Berry tardily 3-valved, interior often resinous-pulpous; seeds externally pulpous, sometimes arillate; testa coriaceous; embryo albuminous, straight; cotyledons wide, foliaceous, or rather thick.—Small trees; leaves alternate, serrate or crenate, pellucid-punctuate, more rarely coriaceous epunctuate (*Scypholætia*[6]); flowers axillary or terminal, glomerate or cymose, subcorymbose; bractlets small, sometimes (*Scypholætia*) larger, thick, connate in subentire or crenate calyciform involucel (*Trop. America*[7]).

9? **Idesia** Maxim.[8]—Flowers dicœcious apetalous; receptacle

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[1] *Gen.*, 127, n. 13.

[2] Spec. 1. *P. lucidus* Benth., *loc. cit.* Limited to Venezuela.

[3] *It.*, 252.—L., *Gen.*, n. 661 (part.).—DC., *Prodr.*, i. 260.—Endl., *Gen.*, n. 5071 (part.).—Clos, in *Ann. Sc. Nat*, sér. 4, viii. 241.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 82.—B. H., *Gen.*, 126, n. 9.—*Thamnia* P. Br., *Jam.*, 245, t. 25.—*Helwingia* Adans., *Fam. des Pl.*, ii. 167 (nec. W.).

[4] Griseb., *Erl. Fl. Trop. Amer.*, 27, 29.

[5] Benn., *Pl. Jav. Rar.*, 192 (not.).—*Lightfootia* Sw., *Prodr.*, 83 (nec Lhér.).

[6] Type of sec. 2 species, namely, *L. cupulata* Spruce, and *E. coriacea* Spruce (ex Benth., *loc. cit.*).

[7] Spec. ad 10. Sw., *Fl. Ind. Occ.*, 950.—H. B. K., *Nov. Gen. et Spec.*, v. 355.—Pœpp. & Endl., *Nov. Gen. et Spec.*, ii. 86, t. 274 (*Samuda*).—Mart., *Nov. Gen. et Spec.*, ii. 165.—Griseb., *Fl. Brit. W.-Ind.*, 22 (*Zuelania*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 102.—Walp., *Ann.*, vii. 225.

[8] In *Bull. Acad. Sc. Petersb.*, x. (1866), 485; *Mel. Biol.*, vi. 19.—B. H., *Gen.*, 972, n. 18 *a*. (Genus imperfectly known by dry specimens, much resembling *Samyda* by insertion of stamens.)

wide depressed. Sepals 3–6, unequal tomentose, imbricated, deciduous. Stamens ∞, free, ∞-seriate subperigynous; receptacle between base of filaments more or less glandular; anthers subovate, introrse (?), longitudinally rimose. Germen (in male flower rudimentary); style small, 3–5-fid; in female flower globose, 1-locular, surrounded by ∞ short staminodes; styles 3–6, patent, apex stigmatiferous thickened. Berry globose;[1] seeds ∞, nidulant in pulp, exterior pulpy; testa crustaceous; albumen fleshy; embryo axile, straight; radicle cylindrical; cotyledons foliaceous, suborbicular.—A large tree; leaves alternate cordate serrate, 5-nerved at base; petiole rather long, hence glanduliferous; stipules 2, small, caducous; flowers[2] in axillary and terminal racemes on long subcernuous branches; male pedicel slender, elongated (*Japan*[3]).

III. SAMYDEÆ.

10. **Samyda** L.—Flowers regular hermaphrodite apetalous; receptacle concave, more or less cupulate or campanulate. Sepals 4–6, connate to greater or less height, equal or unequal (coloured); præfloration much imbricated. Stamens 8–∞, inserted in the throat; filaments more or less high in tube of perianth, more or less long adnate connate; anthers 2-locular, introrse 2-rimose. Germen free, inserted at bottom of receptacle, 1-locular; style at apex capitate stigmatiferous; placentas 3–8, parietal, ∞-ovulate. Fruit coriaceous-fleshy, subglobose or ovoid, finally 3–5-valved at apex. Seeds ∞, angular; aril fleshy; hilum ventral; testa crustaceous; embryo axile, small; cotyledons foliaceous.—Shrubs; leaves alternate, 2-tichous, pellucid-punctuate, base articulate and furnished with small stipules; flowers (large), axillary, solitary or sometimes cymose (*Western India*). See p. 278.

11. **Guidonia** Plum.[4]—Flowers nearly of *Samyda*, smaller; tube of perianth longer or shorter; lobes 4–6, sometimes petaloid, imbri-

[1] Cherry of small size, glabrous, golden, eatable.

[2] Pale yellow, and female smaller than male.

[3] Spec. 1. *I. polycarpa* Maxim., *loc. cit.* partly translated and reedit. in *Ann. Sc. Nat.*, sér. 5, vii. 378.

[4] Plum., *Gen.*, t. 24 (1703).—L., *Gen.*, ed. 2 (1742), 520.—H. Bn., in *Adansonia*, x. 251.—*Casearia* Jacq., *Stirp. Amer.* (1763), 132, t. 85.—DC., *Prodr.*, ii. 48.—Endl., *Gen.*, n. 5060.—Payer, *Fam. Nat.*, 94.—B. H., *Gen.*, 796, n. 1.

cated. Stamens 6 (*Valentinia*[1]) –∞ ; filaments with squamules same in number, alternate elongate, glabrous or villous, connate to greater or less height between themselves and with base of perianth, sometimes short and connate at base round antheriferous filaments (*Enguidonia*) ; anthers introrse, apex sometimes penicillate. Germen free, 1-locular ; placentas parietal, 3–6, 2–∞-ovulate ; style short, capitate, stigmatiferous undivided at apex (*Iroucana*,[2] *Pitumba*,[3] *Valentinia*), or at greater or less height 3-fid (*Piparea*,[4] *Crateria*[5]), sometimes large subpeltate (*Zuelania*[6]). Fruit subbaccate pulpous (*Iroucana*, *Zuelania*), almost dry (*Crateria*) or dry (*Pitumba*), at a greater or less height 4-valved ; valves seminiferous at middle, sometimes boat-shaped (*Piparea*). Seed oblong or angular ; aril fleshy ; embryo albuminous ; cotyledons flat, oblong or orbicular ; radicle straight, terete.—Trees or shrubs ; leaves alternate, 2-stichous, entire, serrate or subspinose-dentate, usually coriaceous, pellucid-punctuate or lineolate, more rarely impunctuate (*Piparea*) ; petiole articulate at base ; stipules 2, linear, often small ; flowers[7] solitary, axillary, usually in umbels (false) or axillary cymes ; pedicels articulated, bracteolate ; bracts sometimes (*Anavinga*) connivent round flowers in involucel (*All Trop. and Subtrop. Regions*[8]).

12. **Osmelia** Thw.[9]—Flowers nearly of *Guidonia*, 4, 5-merous ; sepals much imbricated. Stamens 8–10, inserted with scales, same in number, oblong, villous, alternate. Gynæceum free ; germen lanuginose, 1-locular ; placentas 3, parietal, pauciovulate ; styles 3, short incurved, capitellate stigmatiferous at apex. Capsule subcoriaceous, 3-valved. Seeds few ; testa membranous ; aril fleshy (red) ; embryo

[1] Sw., *Prodr.*, 63 (1797) ; *Fl. Ind. Occ.*, 689.—DC., *Prodr.*, i. 618.—Endl., *Gen.*, n. 5631.

[2] Aubl., *Guian.* (1775), i. 385, t. 127.—*Vareca* Gærtn., *Fruct.*, i. 290, t. 60.

[3] Aubl., *Guian.*, ii. App., 29, t. 385.—*Anavinga* Lamk., *Ill.*, t. 355.—Gærtn. f., *Fruct.*, iii. 240, t. 224.—*Melistaurum* Forst., *Char. Gen.*, 143, t. 72.—*Lindleya* H. B. K., *Nov. Gen. et Spec.*, v. (part.), t. 480 (nec vi. 239).—*Antigona* Velloz., *Fl. Flum.*, iv. t. 145.

[4] Aubl., *Guian.*, ii. App. 30, t. 386.—Gærtn. f., *Fruct.*, iii. t. 224.—DC., *Prodr.*, i. 316.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 116.—H. Bn., in *Adansonia*, x. 252 (*Piparea* gen. forte proprium, ex Pl. *loc. cit.*).

[5] Pers., *Enchir.*, i. 485.—*Chætocrater* R. & Pav., *Prodr.*, 61, t. 36.

[6] A. Rich., *Fl. Cub.*, 88, t. 12.—*Thiodia* Griseb., *Fl. Brit. W.-Ind.*, 22 (nec Benn.).

[7] Whitish, or virescent, yellow or more rarely pink ; often small.

[8] Spec. 75, of which 30 belong to the Old World. H. B. K., *Nov. Gen. et Spec.*, v. 366.—Cambess., in *A. S. H. Fl. Bras. Mer.*, ii. 229.—A. Gray, *Amer. Expl. Exp., Bot.*, i. 79.—Benth., *Fl. Hongkong.*, 121 ; *Fl. Austral.*, iii. 308.—Wight, *Icon.*, t. 1849.—Vent., *Ch. de Pl.*, t. 44.—Griseb., *Fl. Brit. W.-Ind.*, 22.—Bl., *Mus. Lugd.-Bat.*, t. 50.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 705.—Tr. & Pl., in *Ann. Sc. Nat.* sér. 4, xvii. 106 (*Casearia*) 114 (*Zuelania*).—Walp., *Rep.*, i. 546 ; ii. 828 ; v. 406 ; *Ann.*, i. 197 ; ii. 276 (*Casearia*).

[9] *Enum. Pl. Zeyl.*, 20.—B. H., *Gen.*, 797, n. 2.—*Stachycrater* Turcz., in *Bull. Mosc.* (1858), i. 464.

albuminous; radicle short; cotyledons foliaceous suborbiculate.—Trees; leaves alternate petiolate, ovate or oblong-lanceolate, subserrate, not punctuate; stipules minute, deciduous; flowers small in terminal compound racemes; bracts and bractlets small, approximate, in short involucel (*Zeylania and Philippine Islds.*[1]).

13? **Euceræa** Mart.[2]—"Flowers very small; calyx lobes 4, imbricated. Stamens 8; 4 alternate, shorter; filaments alternate with elongated squamules, barbate at apex, connate in short ring. Germen free; style very short; stigma subsessile, radiated, 4–6-partite; ovules 1, 2, ascending. Berry dry, indehiscent; seeds 1, 2, oblique, ascending; base furnished with lacerate aril.—A small glabrous tree; leaves alternate oblong serrate; stipules deciduous; flowers[3] in ramified compound axillary spikes (*North Brazil*[4])."

14. **Lunania** Hook.[5]—Flowers (nearly of *Guidonia*) apetalous, hermaphrodite or more rarely polygamous; receptacle shortly cupulate. Calyx subglobose membranous, valvate, finally divided into 2–5 sepals, patent or reflexed. Stamens 6–12, inserted with squamules same in number, entire or 2-fid, alternate and connate in short cupule at base; filaments free, short or elongate; anthers introrse, ovoid or oblong, 2-rimose. Germen central free, 1-locular, at apex more or less hians between bases of 3 styles, short, dilated, sub-2-lobed stigmatiferous at apex; placentas parietal 3, alternate with styles, wide, ∞-ovulate. Capsule subcoriaceous oligospermous, 3-valved; seeds nearly of *Samyda*.—Trees; branches flexuose; leaves alternate petiolate, 3–5-nerved, minutely pellucid-punctuate; flowers small, crowded in slender elongated racemes, axillary or terminal, simple or ramified, nodding; pedicels articulate at base, minutely ∞-bracteate (*West India and Peru*[6]).

15. **Tetrathylacium** Pœpp. & Endl.[7]—Flowers polygamous-

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[1] Spec. 3, 4. Benth., in *Journ. Linn. Soc.*, v. Suppl., 88.—Thw., *Enum. Pl. Zeyl.*, 20.

[2] *Nov. Gen. et Spec.*, iii. 90, t. 238.—Endl., *Gen.*, n. 5060[1], Suppl. i. 1420.—B. H., *Gen.*, 797, n. 3.

[3] Small, white.

[4] Spec. 1. *E. nitida* Mart., *loc. cit.*—Walp., *Rep.*, v. 407.

[5] In *Lond. Journ. of Bot.*, iii. 517, t. 11, 12.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 89.—B. H., *Gen.*, 797, n. 4.

[6] Spec. 5, of which 4 are from the Antilles.—Griseb., *Fl. Brit. W.-Ind.*, 20; *Pl. Amer. Trop.*, 26; *Pl. Wright. Cub.*, 155; *Cat. Pl. Cub.*, 7.

[7] *Nov. Gen. et Spec.*, iii. 34, t. 240.—B. H., *Gen.*, 119, n. 14.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 105.—*Edmonstonia* Seem., *Voy. Her., Bot.*, 98, t. 18.

dicœcious apetalous. Sepals 4, in male flower, in short cupule at base; in female, in urceolate-globose tube, much imbricated. Stamens 4 (of which 2 anterior), alternating with the calyx lobes and marginally inserted at the base of the disk; filaments short; anthers introrse, apex exappendiculate, base subcordate, longitudinally 2-rimose. Germen free (in male flower rudimentary), 1-locular; style short, afterwards dilated in stigmatiferous head, 3–4-lobed; placentas parietal, 3, 4; "ovules on each crowded. Berry coriaceous, 1-locular, indehiscent or finally 3, 4-valved; seeds ∞; testa hard; embryo axile albuminous; radicle straight inferior."—A shrub or tree; leaves alternate, large, remotely serrate; stipules lateral, 2; flowers small, in ramified spikes springing from trunk or branches; each surrounded at base by a bract and 2 bractlets, lateral membranous, concave, connivent in false involucel (*Trop. South America*[1]).

16. **Ryania** Vahl.[2]—Flowers hermaphrodite apetalous; receptacle subplane or slightly cupulate. Sepals 5, sometimes slightly perigynous, much imbricated.[3] Stamens ∞, slightly perigynous free; anthers linear; cells longitudinally dehiscent at margin or introrsely. Disk interior to stamens, sometimes short cupulate, sometimes much more evoluted or subpetaloid unequally cleft. Germen subfree, 1-locular; style erect, apex dilated stigmatiferous, subequally lobed or divided into 2–6 branches, capitate stigmatiferous reflexed; placentas parietal 2–5, oppositisepalous, ∞-ovulate. Fruit dry, ligneous-suberose, 2–5-valved. Seeds ∞, arillate; testa crustaceous; embryo more or less albuminous, cotyledons wide; radicle straight.—Trees; hairs often stellate; leaves alternate entire penniverved, transversely small veined, sometimes pellucid-punctuate; flowers[4] axillary solitary or few cymose (*Tropical America*[5]).

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[1] Spec. 1. *T. macrophyllum* Pœpp. & Endl., *loc. cit.*—Seem., *op. cit.*, Suppl., 240.—Walp., *Rep.*, ii. 767; *Ann.*, vii. 219.—*Edmonstonia pacifica* Seem., *loc. cit.*—Walp., *Ann.*, iv. 438.

[2] *Ecl. Amer.*, i. 51, t. 9.—Endl., *Gen.*, n. 5093.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 82.—B. H., *Gen.*, 126, n. 8.—*Patrisia* L. C. Rich., in *Act. Soc. Hist. Nat. Par.*, 110.—*Ryanœa* DC., *Prodr.*, i. 255.

[3] Interior 2, 3, dorsally often subconnate costate, convolute.

[4] Often large, handsome.

[5] Spec. 6, 7. Pers., *Enchir.*, ii. 69 (*Patrisia*).—H. B. K., *Nov. Gen. et Spec.*, v. 357 (*Patrisia*).—Deless., *Ic. Sel.*, iii. 8, t. 14 (*Patrisia*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 115.—Walp., *Rep.*, ii. 218; *Ann.*, vii. 225.

17. **Scolopia** Schreb.[1]—Flowers hermaphrodite; receptacle wide pateriform or subplane orbiculate-discoidal at apex. Sepals 4–6, inserted at margin, imbricated, subvalvate or open long before anthesis, not contiguous. Petals (sometimes 0) alternating with sepals and often subsimilar, sometimes at base suddenly narrowed, imbricated or not contiguous. Stamens ∞, inserted ∞-seriate on the upper surface of the receptacle, hypogynous or really perigynous; filaments erect free; anthers extrorse, 2-locular, 2-rimose, surmounted by a connective process various in form, glabrous pilose (more rarely 0). Disk perigynous; receptacle, either sparingly between the insertion of stamens, or more thickly outwardly, dilate-glandular; glandules sometimes very conspicuous, exterior stamens (pale yellow) single or in pairs alternating with sepals. Germen free central, sessile or shortly stipitate, 1-locular, apex tapering in short subentire or stigmatiferous 3, 4-lobed style; placentas parietal 3, 4, alternating with stigmatiferous lobes; ovules on each 2–∞, descending; micropyle introrse superior. Berry inwardly pulpous; seeds 2–∞; funicle more or less elongated; testa hard; embryo albuminous, cotyledons foliaceous.—Trees or shrubs, unarmed or spinescent; leaves alternate, penninerved, entire, sinuate or dentate; petiole at apex sometimes 2-glandular, articulate at base; stipules minute lateral, caducous; flowers in axillary or subterminal cymiferous racemes (*Tropical and Subtropical Africa, Asia, and Australia*[2]).

18. **Ludia** Lamk.[3]—Flowers nearly of *Scolopia*, apetalous; sepals 4–8, imbricated. Exterior of disk dilated in oppositipetalous glandules. Stamens ∞, subperigynous; anthers extrorse, finally more or less versatile. Germen nearly of *Scolopia;* style finally elongated, 3–6-fid at apex; ovules on same number of parietal placentas ∞.

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[1] *Gen.*, 335 (1789).—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 244.—Payer, *Fam. Nat.* 111.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 86.—B. H. *Gen.*, 127, n. 15.—H. Bn., in *Adansonia*, x. 253. — *Phoberos* Lour., *Fl. Cochinch.* (ed. 1790), 317.—Endl., *Gen.*, n. 5068.—*Limonia* Gærtn., *Fruct.* i. 278, t. 58 (nec L.).—*Dasyanthera* Presl, *Rel. Hænk.*, ii. 90, t. 66.—Endl., *Gen.*, n. 5018.—*Rhinanthera* Bl., *Bijdr.*, 1121. — Endl., *Gen.*, n. 5069. — *Eriudaphus* Nees, in *Eckl. et Zeyh. Enum. Pl. Afric.*, 271.—Payer, *Fam. Nat.*, 111.—*Adenogyrus* Kl., in *Walp. Ann.*, iv. 226.

[2] Spec. ad 15. Wight & Arn., *Prodr.*, i. 29 (*Phoberos*).—Benn., *Pl. Jav. Rar.*, 187, t. 39 (*Phoberos*).—Harv. & Sond., *Fl. Cap.*, i. 67 (*Phoberos*).—Benth., *Fl. Hongk.*, 19.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 106; *Fl. Sum.*, 159.—Thw., *Enum. Pl. Zeyl.*, 16.—Hance, in *Ann. Sc. Nat.*, sér. 4, xviii. 214; sér. 5, v. 207.—H. Bn., in *Adansonia*, i. 120 (*Eriudaphus*).—Benth., *Fl. Austral.*, i. 107. — F. Muell., *Fragm.*, iii. 11.—Walp., *Ann.*, vii. 227, 228 (*Eriudaphus*).

[3] *Dict.*, iii. 612; *Ill.*, t. 466.—DC., *Prodr.*, i. 261.—Endl., *Gen.*, n. 5070.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 243.—B. H., *Gen.*, 126, n. 10.—H. Bn., in *Adansonia*, x. 253.

Berry more or less coriaceous (dehiscent?). Seeds few obovoid, sometimes slightly incurved.—Shrubs; leaves alternate, usually rather nitid, in the same strips sometimes very polymorphous, impunctuate, articulate at base; stipules very small or 0; flowers axillary, solitary or few, cymose or glomerate (*Tropical Oriental Continent, and Insular Africa*[1]).

19. **Ruhlia** H. B. K.[2]—Flowers nearly of *Ludia* (or *Scolopia*); receptacle shortly cupuliform. Sepals 3, 5, slightly perigynous, and petals same in number alternate, inserted with and similar to them, all much imbricated, persistent. Stamens ∞, slightly perigynous (or interior all hypogynous), inserted above pagina of receptacle ∞-seriate; filaments capillary free; anthers extrorse, exappendiculate. Germen free central, 1-locular, tapering into style above; style at apex dilated, subentire or more or less deeply 3–5-lobed stigmatiferous; placentas parietal 3–5; ovules on each ∞, descending. Fruit (indehiscent?) nearly of *Ludia* or *Scolopia;* seeds (often outwardly undulate-striate) albuminous.—Trees; leaves alternate, base sometimes oblique glandular-serrate; petiole articulate at base; stipules small; flowers[3] in ramified, terminal or lateral cymiferous racemes[4] (*N.-Grenada*[5]).

20. **Banara** Aubl.[6]—Flowers nearly of *Ruhlia* (or *Scolopia*), hermaphrodite or sometimes polygamous, 3–5-merous; sepals valvate. Germen free; placentas 3–8, parietal, ∞-ovulate; apex of style capitellate stigmatiferous; entire or 3–8-lobed. Berry, sometimes coriaceous, indehiscent; seeds ∞, albuminous, exterior striate. Other characters of *Ruhlia.*—Trees or shrubs; leaves alternate, often unequal at base, often glandular-serrate, sometimes pellucid-punctuate; petiole often 2-glandular at apex, articulate at base;

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[1] Spec. 3, v. 4. Clos, *loc. cit.* (part.).—Tul., in *Ann. Sc. Nat.*, sér. 5, ix. 334.—Walp., *Ann.*, vii. 226.

[2] *Nov. Gen. et Spec.*, vii. 234, t. 652, 653.—Endl., *Gen.*, n. 5074.—B. H., *Gen.*, 798, n. 7.—H. Bn., in *Adansonia*, x. 255.

[3] Small or very minute, whitish.

[4] A genus Tr. & Pl., referred not rightly to the very similar *Banara;* it differs from it especially in its nonvalvate calyx and structure of seed.

[5] Spec. ad 3. Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 101 (*Banara*).—Walp., *Rep.*, i. 204; v. 56.

[6] *Guian.*, i. 547, t. 217.—J., *Gen.*, 293.—Lamk., *Dict.*, i. 366; *Ill.*, t. 464.—DC., *Prodr.*, 1. 259.—Endl., *Gen.*, n. 5073.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 239.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 90.—B. H. *Gen.*, 798, 1007, n. 6.—H. Bn., in *Adansonia*, x. 255.—*Pineda* R. & Pav., *Prodr.*, 76, t. 14; *Syst.*, i. 133.—DC., *Prodr.* ii. 54.—Don, in *Edinb. N. Philos. Journ.*, x. 116.—Endl., *Gen.*, n. 5075.—*Ascra* Schott, in *Spreng. Syst., Cur. Post.*, 407.—*Xyladenius* Desvx., in *Ham. Prodr. Fl. Ind. Occ.*, 41.—*Boca* Velloz., *Fl. Flum.*, v. t. 113.—*Christannia* Presl, *Rel. Hænk.*, ii. 91, t. 67.—Endl., *Gen.*, n. 5077.

stipules minute; flowers[1] in simple or oftener compound cymiferous racemes, short or elongated; pedicels bracteolate (*Trop. America*[2]).

21. **Aphloia** Benn.[3]—Flowers hermaphrodite apetalous; receptacle cupuliform, interior furnished with thin disk. Sepals 4, 5, much imbricated.[4] Stamens ∞, inserted with slightly perigynous calyx outside the disk; filaments free, corrugate-inflexed in bud; anthers short, introrse, 2-rimose, finally exserted. Germen subcentral, free sessile, produced in short style, peltate-stigmatiferous wide at apex; ovules ∞, usually few, inserted in 2 series on parietal placentas, horizontal campylotropous.[5] Fruit baccate, finally often dry, dehiscent(?); seeds few, obovoid-incurved; testa crustaceous; albumen thin; embryo incurved; cotyledons ovate. — Trees or shrubs; leaves[6] alternate articulated entire, dentate or polymorphous and variously inciso-lobed; flowers axillary, solitary or few, sessile or pedicellate (*Trop. Eastern Ins. Africa*[7]).

22. **Azara** R. & Pav.[8]—Flowers apetalous hermaphrodite or more rarely polygamous; receptacle depressed or rather concave.[9] Sepals 4 or more rarely 5, 6, valvate or more rarely more or less imbricated.[10] Stamens ∞, in phalanges equal in number to sepals, and superposed to them; filaments in each ∞ or more rarely subdefinite in number;[11] the lateral often with the exterior gradually smaller, and sometimes antherless; anthers short, 2-locular, extrorse, 2-rimose. Glandules 4–6, placed before sepals free, or connate at base in subperigynous disk. Germen free (in male flower rudimentary), inserted in

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[1] Small, sometimes virescent, pubescent or tomentose.

[2] Spec. ad 12. Pœpp. & Endl., *Nov. Gen. et Spec.*, iii. 74, t. 285 (*Kuhlia*).—Tul., in *Ann. Sc. Nat.*, sér. 3, vii. 288.—Griseb., *Fl. Brit. W.-Ind.*, 22 (*Trilix*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 100 (part.).—Walp., *Rep.*, i. 204, 205 (*Pineda*); ii. 765; *Ann.*, i. 61.

[3] *Pl. Jav. Rar.*, 192.—Endl., *Gen.*, n. 5072[2] —Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 271, 273. —Benth., in *Journ. Linn. Soc.*, v. Suppl., 85.—B. H., *Gen.*, 126, n. 11.—H. Bn., in *Adansonia*, x. 253.—*Neumannia* A. Rich., *Fl. Cub.*, 96, not. (nec Ad. Br.).

[4] Usually thinly spotted.

[5] Raphe short, micropyle extrorse lateral; coats double.

[6] When dry, often pale lutescent-virescens.

[7] Spec. 2, 3. Poir., *Dict.*, v. 627 (*Prockia*). —Lamk., *Ill.*, t. 465, fig. 3 (*Prockia*).—Vahl, *Symb. Bot.*, ii. 69, 70 (*Lightfootia*).—Tul., in *Ann. Sc. Nat.*, sér. 5, ix. 431 (*Aphlœa*).—Walp., *Ann.*, vii. 226.

[8] *Prodr.*, 79, t. 36.—Poir., *Dict.*, Suppl., i. 550.—DC., *Prodr.*, i. 262.—Endl., *Gen.*, n. 5075.—Payer, *Fam. Nat.*, 110.—Benth., in *Journ. Linn. Soc.*, v. Suppl., 85.—B. H., *Gen.*, 127, 972, n. 14.—H. Bn., in *Adansonia*, x. 525.—*Lilenia* Berter., in *Bull. Sc. Nat.*, xx. 108 (ex Endl.).—*Tetracocyne* Turcz., in *Bull. Mosc.* (1863), i. 555.

[9] Sometimes outside below insertion of calyx thickened in ring.

[10] Sometimes finally fleshy, or inwardly pilose.

[11] "In *A. microphylla* (Hook. f., *Fl. Ant.*, ii. t. 244, not.), stam. defin. cum sepal. altern. et gland. totid. sepal. oppos., ut in *Homalineis*, sed stam. vix perig., et cæt. omn. cum *Azara* conveniunt." (B. H., *loc. cit.*)

receptacle, 1-locular; style simple tubular, apex stigmatiferous, subentire or 3, 4-lobed; placentas parietal, same in number, ∞-ovulate.[1] Berry subglobose, with often apiculate style, sometimes dehiscent at apex; seeds ∞; testa crustaceous; embryo albuminous, straight or slightly incurved; cotyledons rather wide.—Shrubs or more rarely trees;[2] leaves entire or serrate; stipules small or oftener rather large, foliaceous; flowers[3] fasciculate or in short spikes or racemes, sometimes corymbose or subumbellate[4] (*South Brazil and Chili*[5]).

23. **Pyramidocarpus** Oliv.[6]—Flowers hermaphrodite; receptacle shortly cupulate. Sepals 3, 4, gradually proceeding to 4–10 coriaceous petals, and perigynously inserted with them, much imbricated. Stamens 20–30, perigynous; filaments erect, short; anthers oblong subbasifixed; cells linear, marginally adnate to rather flat connective, longitudinally rimose. Germen free, 3-agonal, 1-locular, attenuated into 3 small styles stigmatiferous at apex; placentas 3, parietal, alternating with styles, ∞-ovulate. "Fruit large,[7] very thick, coriaceous, wide, cubical or pyramidal; angles thickened, rotund; faces carinate at middle; style short cuspidate, 3, 4-valved, oligospermous. Seeds large, wide, oblong or subrotund, angular; testa crustaceous, rugulose, covered with thin pulp; albumen copious, fleshy; embryo?—A small glaberrimous tree; small branches terete, smooth, annulate above base of leaves; leaves alternate petiolate, coriaceous, oblong, integerrimus, bright; petiole thickened at apex; stipules fallen;" flowers[8] in dense short axillary spike;[9] pedicels very short articulated; bracts very short (*Tropical Western Africa*[10]).

24. **Abatia** R. & Pav.[11]—Flowers hermaphrodite apetalous; re-

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[1] Ovules incompletely anatropous, sometimes suborthotropous; micropyle introrse superior; coats double. In *A. crassifolia* (cultivated in our gardens) superior bud much younger than others.

[2] Very bitter.

[3] Virescent, or (if the anthers are coloured) abundantly golden.

[4] A genus certainly allied to *Calantica* and *Homalium*, according to Payer (*Fam. Nat.*, 110), "cæterum inter *Bixineas* (*Flacourtieas*) et *Samydaceas* (*Banareas*) quasi medium." (B. H., *loc. cit.*).

[5] Spec. ad 12. R. & Pav., *Syst.*, 137.—Pœpp. & Endl., *Nov. Gen. et Spec.*, ii. t. 167.—Don, in *Edinb. N. Phil. Journ.*, x. 117.—Hook. & Arn., *Beech. Voy. Bot.*, t. 4.—Clos, in *C. Gay Fl. Chil.*, i. 191.—*Bot. Mag.*, t. 5178.—*Bot. Reg.*, t. 1788.—Walp., *Rep.*, i. 104; *Ann.*, i. 62; vii. 226.

[6] In *Journ. Linn. Soc.*, ix. 171.—B. H., *Gen.*, 799, 1007, n. 8.

[7] Of the size of *Avellana*.

[8] "Buds small, globose, glabrous."

[9] Inferior, younger.

[10] Spec. 1. *P. Blackii* Oliv., *loc. cit.*—Mast., in *Oliv. Fl. Trop. Afr.* ii. 495.

[11] *Prodr.*, 78, t. 14.—DC., *Prodr.*, i. 503.—Don, in *Edinb. N. Phil. Journ.* x. 121.—Endl., *Gen.*, n. 6160.—Pl., in *Hook. Lond. Journ.*, iv.

ceptacle shortly cupuliform. Sepals 4, valvate. Stamens ∞, sometimes subdefinite in number (8–15) (*Aphærema*[1]); filaments inserted within receptacle, 2–∞-seriate, slightly perigynous, filiform; anthers oblong or shorter (*Raleighia*[2]) extrorse, finally versatile, longitudinally rimose; filamentous hairs[3] at exterior of androceum inserted at throat of receptacle, crowded (*Euabatia*), or thinner (*Raleighia*), sometimes 0 or very few (*Aphærema*). Germen free, central, 1-locular; style slender, tubular, apex stigmatiferous, entire or shortly 3-lobed; placentas parietal 2–4, ∞-ovulate. Capsule globose, accompanied by base of calyx, subcoriaceous, loculicidal. Seeds ∞, more or less winged; testa crustaceous; albumen fleshy; embryo axile straight; cotyledons short.—Glabrous shrubs, or more or less clothed with fasciculate hairs; leaves opposite or verticillate, serrate, exstipulate; flowers in erect terminal racemes, bracteate (*Trop. and Subtrop. America*[4]).

IV. LACISTEMEÆ.

25. **Lacistema** Sw. — Flowers hermaphrodite or polygamous; receptacle minute convex. Sepals 4–6, free, sometimes very short or 0, often unequal, incurved at apex in bud, persistent. Disk unequally-cupulate, obtusely lobed, regular or anterior usually much larger; margin sometimes variously inflexed. Stamen 1, interior within disk anterior; filament free, hypogynous, apex dilated in 2-crurate connective; anther cells separate, terminating each branch marginally or inwardly rimose. Germen superior, subsessile or shortly stipitate, 1-locular; style erect, apex divided in 3 lobes, slender, recurved, unequal, stigmatiferous; lobes 2 anterior; the third posterior; parietal placentas 3, alternating with style lobes; each 1, 2-ovulate (sometimes 1, 2 sterile); ovules descending, incompletely anatropous; micropyle introrse superior. Fruit drupaceo-capsular, finally loculicidal, 3-valved; interior of valves placentiferous at middle; fertile usually 1, 1-spermous. Seed descendent; exterior fleshy; testa crusta-

476, t. 16.—B. H., *Gen.*, 199, 1007, n. 9.—H. Bn., in *Adansonia*, x. 255.—*Myriotriche* Turcz., in *Bull. Mosc.* (1863), i. 554.—*Graniera* Mand. & Wedd., *Pl. And. Boliv. Exs.*, n. 1511 (ex B. H.).

Miers, in *Proceed. Hort. Soc.* (1863), 294.—B. H., *Gen.*, 799, n. 11.

[2] Gardn., in *Hook. Lond. Journ.*, iv. 97.—B. H., *Gen.*, 799, n. 10.

[3] Perhaps in sterile stamens filaments much attenuated; stamens either all fertile or partly antherless?

[4] Spec. ad 8. H. B. K., *Nov. Gen. et Spec.*, v. 358, t. 486.—H. Bn., in *Adansonia*, x. 256.—Walp., *Rep.*, v. 834 (*Raleighia*).

ceous; albumen copious, fleshy; embryo straight, radicle cylindrical superior; cotyledons flat.—Small trees or shrubs; leaves alternate, 2-stichous, persistent; petiole articulate at base; stipules 2, lateral caducous; limb simple, penninerved, sometimes pellucid-punctuate; flowers in crowded unequal axillary spikes; bracts alternate, 1-flowered; bractlets 2, lateral linear, often formed like sepals and usually narrower (*Trop. America*). See p. 282.

V. CALANTICEÆ.

26. **Calantica** JAUB.—Flowers hermaphrodite; receptacle widely cupuliform. Sepals 5–8, perigynously inserted at margin of receptacle, valvate. Disk within receptacle, and outwardly dilated at apex into lobes concave or marginate opposite sepals and adnate to them. Petals 5–8, perigynous linear, or more rarely 0 (*Bivinia*). Stamens same in number, alternating with petals, perigynous, but inserted a little below petals, sometimes ∞ (*Bivinia*), in alternipetalous fascicles; filaments free; anthers 2-locular, extrorse, 2-rimose. Germen central free, 1-locular; styles 3–6, apex stigmatiferous linear; placentas 3–6, ∞-ovulate. Capsule ovoid, 3–6-valved; seeds ∞, inserted at middle of valve, external cottony; testa crustaceous; albumen fleshy; embryo straight, radicle terete; cotyledons foliaceous, ovate or subcordate.—Trees; leaves alternate, petiolate, simple, glandular-serrate or crenate; stipules small; flowers small, in compound cymiferous racemes; bracts and bractlets setaceous, often with calyx silky (*Trop. Eastern Cont. and Ins. Africa*). See p. 284.

27. **Dissomeria** BENTH.[1]—Receptacle shortly cupuliform. Sepals 4, imbricate. Petals 8, series double inserted with shorter calyx, imbricated, persistent. Glandules same in number, alternate, perigynous, marginate on disk. Stamens ∞, in oppositipetalous fascicles; filaments filiform, much pilose; anthers subglobose. Germen subfree, hirsute, 1-locular; styles 3, filiform, stigmatiferous at apex, acute; parietal placentas 3, 4; ovules a few inserted at each apex, descending. Fruit "thick, coriaceous, indehiscent."—A shrub; leaves

[1] BENTH., *Niger*, 362.—B. H., *Gen.*, 800, n. 14.

alternate ovate-oblong, large, glandular-crenate, petiolate; stipules falcate, rather large, deciduous; flowers in axillary, slender, elongated, interrupted spikes (*Trop. Western Africa*[1]).

28. **Asteropeia** Dup.-Th.[2]—Flowers hermaphrodite; receptacle very short, cupulate. Sepals 5, obtuse, imbricate, persistent, and petals 5, alternate, deciduous, perigynously inserted on margin of receptacle. Stamens 10–15, inserted with perianth; filaments at base in 1-adelphous ring, otherwise free; anthers short, 2-locular, rimose. Germen free, sessile, incompletely 3-locular, apex obtuse or attenuated in style stigmatiferous subentire or 3-fid at apex; ovules in each cell 2, inserted below apex, descending. Capsule attended by base of calyx and androceum, loculicidal, sometimes inwardly fungous; seeds ∞, hippocrepiform; embryo . . . . ?—Humble trees or scandent shrubs; leaves alternate, etiolate, exstipulate; oblong or obovate, entire, coriaceous; flowers[3] in terminal and axillary ramified racemes; bracts and bractlets caducous (*Madagascar*[4]).

VI. HOMALIEÆ.

29. **Homalium** Jacq.—Flowers hermaphrodite; receptacle concave, turbinate or obconical. Sepals 5–7, and petals same in number, alternate, linear oblong, inserted in throat of receptacle, imbricated, persistent. Stamens inserted with petals 2–∞ and opposite, either equal in number (*Blackwellia*) or before each in fascicles with perigynous alternate glandules (*Racoubea*); filaments free; anthers 2-locular, extrorse, sub-2-dymous, 2-rimose. Germen partly adnate to interior of receptacle, 1-locular; style lobes 2–6, slender, apex simple or capitellate stigmatiferous; placentas parietal same in number, alternate; ovules on each placenta ∞, or few, sometimes 1 (*Nisa*), descending; micropyle introrse, superior. Capsule semi-superior, coriaceous, apex 2–6-valved; seeds usually few, angulate or oblong; testa crustaceous; embryo albuminous; cotyledons foliaceous. —Trees or shrubs; leaves alternate petiolate simple, usually glan-

[1] Spec. 1. *D. crenata* Benth., *loc. cit.*—Mast., in *Oliv. Fl. Trop. Afr.*, ii. 496.—Walp., *Ann.*, ii. 278.

[2] *Gen. Nov. Madag.*, 22, 73; *Hist. Vég. Iles Afr.*, 51, t. 15.—DC., *Prodr.*, ii. 55.—Endl., *Gen.*, n. 5092.—Tul., in *Ann. Sc. Nat.*, sér. 4, viii. 79 (*Asteropea*).—B. H., *Gen.*, 801, n. 17.

[3] Small, whitish; or in other species pale yellow.

[4] Spec. 2. Tul., *loc. cit.*, 80-82.

dular-crenate or serrate; stipules small or 0; flowers axillary, in ramified cymiferous racemes (*All warm regions*). See p. 276.

30? **Byrsanthus** Guillem.—Flowers nearly of *Homalium;* receptacle obconical. Sepals 4–6, and petals same in number, alternate, just alike, induplicate at margin, all inserted at summit of receptacle, persistent. Stamens 3 times as many as petals, of which 4–6 oppositipetalous, are outwardly accompanied by a glandule, attended without by 2 stamens; filaments slender; anthers extrorse. Disk within stamens, of 4–6 glands, alternipetalous, perigynous, constant. Germen large, partly adnate to interior of receptacle, 1-locular; placentas 4–6, parietal, ∞-ovulate; style at apex 4–6-fid, lobes dilated at summit stigmatiferous. Capsule 1-locular, apex 4–6-valved; seed finally 1; albumen fleshy; embryo wide; cotyledons foliaceous.—Shrubs; leaves alternate exstipulate; inflorescence of *Homalium;* pedicels articulated, very short (*Trop. Western Africa*). See p. 287.

VII. PANGIEÆ.

31. **Pangium** Rumph.—Flowers dicœcious; receptacle rather convex. Calyx subglobose, valvate, unequally torn. Petals 5–8, imbricated; scales same in number, lying upon them inwardly at base. Stamens ∞; filaments at base thickened, subfleshy, much attenuated at apex; anthers ovate, introrse, 2-locular, 2-rimose. Stamens in female flower few (4–8), subulate. Germen free, sessile, apex stigmatiferous, wide depressed, subglandular, 2–4-lobed, unequally sulcate. Ovules ∞, transverse or oblique, anatropous, inserted on 2 or more rarely 3 parietal placentas rather prominent. Fruit large, baccate, indehiscent; seeds ∞, nidulant in pulp, large, unequally compressed; hilum lateral large, elongated; testa ligneous, exterior prominent-nerved; albumen copious, oily; embryo axile, more or less oblique; radicle conical; cotyledons wide, foliaceous, base subcordate, digitinerved.—A tree; leaves alternate; petiole furnished at base with adnate stipules more or less persistent; limb cordate, digitinerved, entire or 3-lobed at base; flowers axillary; males in ramified cymose racemes; females solitary (*Java*). See p. 288.

32. **Gynocardia** R. Br.[1]—Flowers diœcious (nearly of *Pangium*); calyx cupulate, valvate, 5-dentate, sometimes unequally torn. Petals imbricated or contorted, and stamens of *Pangium;* anthers elongated, subbasifixed, introrse. Staminodes in female flower 5–15. Germen sessile; styles 5, at apex wide, capitate, stigmatiferous; placentas parietal, 5, ∞-ovulate. Berry large; seeds ∞ (nearly of *Pangium*).—A tree; leaves alternate entire; petiole short; flowers solitary or cymose pedicellate, axillary or springing from the wood (*India*[2]).

33. **Bergsmia** Bl.[3]—Flowers small, diœcious; perianth and oppositipetalous scales of *Pangium.* Stamens in male flower 4–6, fertile; filaments rather thick at base, coalescing round base of rudimentary gynæceum, recurved at apex; anthers basifixed, introrse, afterwards radiating; cells finally rimose above; in female flower 4, 5, sterile, subulate, alternipetalous. Germen sessile; apex stigmatiferous, depressed 2, 3-lobed; placentas parietal 2, 3; ovules on each 2–∞. Fruit . . . ?—Trees; leaves alternate (nearly of *Gynocardia*), stipulate; flowers in axillary simple racemes; pedicels alternate, articulate at base (*Java*[4]).

34. **Trichadenia** Thw.[5]—Flowers diœcious (nearly of *Pangium*); calyx valvate, unequally torn, or calyptrately circumcissile at base. Petals imbricated or more usually contorted; scales placed opposite within, oblong, coriaceous, velvety. Stamens in male flower 5, alternipetalous; filaments erect; anthers elongated; cells linear, marginal, longitudinally rimose. Germen (in male flower sometimes rudimentary) apex crowned by short, thick, unequally cristate or crenate stigmatiferous apex of style. Placentas parietal, 3; ovules on each 1 (or more rarely 2), ascending. Berry oligospermous; seeds nidulant; embryo albuminous; cotyledons foliaceous, plicate-rugose.—A

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[1] In *Roxb. Pl. Corom.*, iii. 95, t. 299.—B. H., *Gen.*, 129, n. 24.—*Chaulmoogra* Roxb., *Fl. Ind.*, iii. 835.—*Chilmoria* Ham., in *Trans. Linn. Soc.*, xiii. 500.—*Munnicksia* Dennst., *Hort. Malab.*, i. n. 36 (ex Endl.)—*Marotti* Rheed., *Hort. Malab.*, *loc. cit.*

[2] Spec. 1. *G. odorata* R. Br., *loc. cit.;* in *Benn. Pl. Jav. Rar.*, 207; *Misc. Works.* ed. Benn., ii. 716.—Bl., *Rumphia*, iv. 23.—*Chaulmoogra odorata* Roxb. — *Chilmoogra dodecandra* Ham. (vulg. *Chaulmoogri, Chawulmoogri, Petarcurrah*).

[3] *Rumphia*, iv. 23, t. 178 C, fig. 2.—B. H., *Gen.*, 129, n. 25.

[4] Spec. 1. *B. javanica* Bl., *loc. cit.;* *Mus. Lugd.-Bat.*, i. 16.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 111; *Fl. Sum.*, 159.—Walp., *Ann.*, ii. 63.

[5] In *Hook. Kew Journ.*, vii. 196, t. 8.—B. H., *Gen.*, 129, n. 26.

tree; leaves alternate, petiolate, penninerved; stipules foliaceous, caducous; flowers in axillary ramified cymiferous racemes (*Zeylania*[1]).

35. **Hydnocarpus** Gærtn.[2] — Flowers polygamous-diœcious; sepals 4, 5, free, much imbricated. Petals 5, imbricated or contorted; scales same in number, placed within at base, opposite. Stamens in male flower 5, alternipetalous, or 6–8; filaments hypogynous, free; anthers basifixed, subreniform or suboblong, 2-rimose at margin. Staminodes in female flower 5–∞, sterile or sometimes furnished with fertile anthers. Germen sessile; styles 3–6, short or more or less elongated, unequally dilated, stigmatiferous at apex; placentas same in number, parietal; ovules on each ∞, anatropous. Berry large, subcorticate; seeds ∞; testa hard, striate; albumen oily; embryo axile; cotyledons foliaceous, flat or subplicate.—Trees; leaves alternate, shortly petiolate; stipules lateral, caducous; flowers in short axillary cymiferous racemes; females few or solitary[3] (*Trop. Asia*[4]).

36. **Rawsonia** Harv. & Sond.[5]—Flowers polygamous; sepals 4, 5, much imbricated, gradually proceeding to same number of petals, much imbricated. Scales complanate subpetaloid or shortly pilose (*Dasylepis*[6]), placed inwardly at the base, before each petal. Stamens ∞, inserted on slightly dilated receptacle;[7] filaments linear or lanceolate-oblong, more or less sagittate at base. Germen superior; placentas parietal, ∞-ovulate; style erect, stigmatiferous at apex with more or less elongate lobes,[8] sometimes finally radiate (*Eurawsonia*). Fruit baccate?—Glabrous trees or shrubs; leaves alternate, serrate or dentate; stipules small, deciduous; flowers axillary, racemose (*Dasylepis*), solitary or glomerate[9] (*Trop. Western and Southern Africa*[10]).

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[1] Spec. 1. *T. zeylanica* Thw., *loc. cit.*; *Enum. Pl. Zeyl.*, 19.—Walp., *Ann.*, iv. 229.

[2] *Fruct.*, i. 288, t. 60.—DC., *Prodr.*, i. 257.—Endl., *Gen.*, n. 5085 (part.).—Bl., *Rumphia*, iv. 21, t. 178 B, fig. 1 (nec).—B. H., *Gen.*, 129, n. 28.

[3] Whether of this genus (characters being a little changed) *Taraktogenos Blumei* Hassk. (*Retzia* 127;—B. H., *Gen.*, 129, n. 27;—Miq., *Fl. Ind.-Bat.*, i. p. ii. 110; *Fl. Sum.*, 159;—Walp., *Ann.*, iv. 229; vii. 232;—*Hydnocarpus heterophylla* Bl.), Javanese tree, habit of *Hydnocarpus*, of which it is said, sepals 4, petals 8, stamens 8, or three times the number of petals; ovules indefinite in number.

[4] Spec. 5, 6. Vahl, *Symb. Bot.*, iii. 100.—Wight, *Ill.*, t. 16; *Icon.*, t. 942.—Wight & Arn., *Prodr.*, i. 30.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 110; *Fl. Sum.*, 159.—Walp., *Rep.*, v. 58 *b*; *Ann.*, i. 63; ii. 62; iv. 230; vii. 232.

[5] *Fl. Cap.*, 67.—B. H., *Gen.*, 127, n. 12.—H. Bn., in *Adansonia*, x. 257.

[6] Oliv., in *Journ. Linn. Soc.*, ix. 170.—B. H., *Gen.*, 972, n. 26 *a*.

[7] Whence often slightly perigynous.

[8] In *Dasylepis* long erect-connivent.

[9] Gen. nearly related to *Pangium* and *Oncoba*. By more recent authors *Rawsonia* is placed among the *Flacourtieæ*; while Oliver rightly inserts *Dasylepis* after *Trichadenia*, on account of its oppositipetalous scales.

[10] Spec. 2. Harv., *Thes. Cap.*, t. 31.—Walp., *Ann.*, vii. 226.

37. **Kiggelaria** L.[1]—Flowers diœcious; receptacle shortly depressed, glandular, rather villous. Sepals 5, free, valvate or sarcely imbricated. Petals same in number, alternate, imbricated; scales same in number, complanate-fleshy, placed inwardly at base before each petal, and connate to greater or less height. Stamens in male flower few (usually 10–12), in female 0; filaments short, free, erect; anthers basifixed; cells 2, lateral, apex dehiscing in short clefts or pores. Germen free (in male flower 0); placentas parietal 2–5; ovules usually few; styles 2–5, stigmatiferous reflexed at apex. Fruit fleshy, with difficulty dehiscing, or dry, imperfectly 2–5-valved. Seeds 1–∞, exterior pulpy; albumen fleshy, copious; embryo rather large; cotyledons foliaceous, digitinerved at base.—Unarmed shrubs, often stellate-pubescent; leaves alternate, exstipulate, entire or crenate; flowers in axillary cymes, shortly racemose, bracteate (*South Africa*[2]).

VIII. PAPAYEÆ.

38. **Papaya** T.—Flowers diœcious, or more rarely polygamous. Male calyx small or very minute, 5-lobed or 5-dentate, imbricated or valvate. Corolla hypocrateriform; tube elongated; lobes 5, oblong or linear, præfloration dextrorse (*Eupapaya*) or sinistrorse contorted, sometimes but more rarely valvate (*Vasconcella*). Stamens 10, 2-seriate, inserted in throat of corolla of which 5, oppositipetalous, often subsessile; other 5 longer, alternate; filaments free or subfree, sometimes connate at base to a greater or less height (*Jacaratia*); anthers erect, adnate, introrse 2-rimose; connective often produced beyond cells. Germen rudimentary, subulate. Calyx of female flower as in male. Petals 5, free, erect, contorted or valvate, deciduous. Staminodes 0, or in hermaphrodite flower fertile stamens 1–10. Germen free, sessile, 1-locular or more rarely by false septa, 5-locular (*Vasconcella*); placentas 5, parietal, ∞-ovulate; style short, presently or at the base divided into 5 lobes, dilated or linear, simple, sometimes 2–∞-lobed. Berry inwardly pulpous, indehiscent. Seeds ∞; external coat subfleshy or suberose arilliform;

[1] *Gen.*, n. 1128.—J., *Gen.*, 387.—Gærtn., *Fruct.*, i. 206, t. 44.—Lamk., *Dict.*, iii. 365; *Ill.*, t. 821.—Endl., *Gen.*, n. 5082.—DC., *Prodr.*, i. 257.—Clos, in *Ann. Sc. Nat.*, sér. 4, viii. 267.—B. H., *Gen.*, 130, n. 29.

[2] Spec. 3. L., *Hort. Cliff.*, t. 29.—Jacq., *Coll.*, 296; *Ic. Rar.*, t. 628.—Harv. & Sond., *Fl. Cap.*, i. 71.—Walp., *Ann.*, iv. 230; vii. 232.

testa crustaceous, smooth, rugose or aculeate; albumen fleshy; embryo axile; cotyledons flat, elliptical-oblong; radicle terete.—Trees or shrubs full of milky juice; trunk often simple, apex leafy; sometimes aculeate or spinose (*Jacaratia*); leaves alternate petiolate subpeltate palmate or digitate, 5–12-foliolate, more rarely oblong, exstipulate; flowers solitary or in axillary or terminal cymiferous racemes, sometimes growing from the trunk, ebracteate (*Trop. America*). See p. 289.

IX. TURNEREÆ.

39. **Turnera** L.—Flowers regular, hermaphrodite; tube (of receptacle?) more or less elongated, cylindrical or obconical; limb of calyx campanulate or subinfundibuliform, 5-partite, imbricated. Petals 5, inserted in the throat; claw short, naked or very rarely (*Erblichia*) crowned with short filaments; limb obovate or obcuneate, or subspathulate wide, membranous, coloured, in bud contorted, or more rarely minute, shorter than calyx, subsepaloid. Stamens 5, alternipetalous; anthers oblong, introrse 2-rimose; filaments free, inserted in the throat, or in the tube, at a greater or less height from base to throat, more or less perigynous or subhypogynous (*Wormskioldia*). Germen free, 1-locular; styles 3, simple or 2-partite (*Piriqueta*), apex stigmatiferous subentire (*Erblichia*), or flabellate, 2–5-∞-fid; ovules on each placenta 2–∞, descending; micropyle extrorse, superior. Capsule 1-locular, subovoid or oblong, sometimes siliquiform torulose (*Wormskioldia*), more or les high valvate; valves inwardly at middle 1–∞-spermous. Seed oblong or cylindrical, slightly curved; aril membranous; testa crustaceous, exterior foveolate; albumen copious, fleshy; embryo axile; radicle cylindrical; cotyledons plano-convex.—Herbs, undershrubs or shrubs, glabrous, pubescent, or tomentose; leaves alternate, petiolate, or sessile; stipules lateral, small, or 0; limb entire, serrate, or pinnatifid, base sometimes 2-glandular; flowers axillary, solitary, or rarely cymose or racemose, sometimes adnate to petiole to greater or less height (*Trop. Africa and America*). See p. 294.

X. COCHLOSPERMEÆ.

40. **Cochlospermum** K. — Flowers hermaphrodite; receptacle rather convex. Sepals 5, imbricated, deciduous. Petals 5, alternate, large, contorted or imbricated. Stamens ∞, inserted on eglandular receptacle; filaments subequal, or some longer and wider, free; anthers oblong or linear, 2-locular, apex poricidal, or dehiscing in short oblique clefts, confluent at apex; connective sometimes apiculate beyond cells. Germen free, 1-locular; placentas 3–5, more or less prominent in cavity, coalescing in axis at base, or sometimes nearly to apex (*Amoreuxia*); ovules on each placenta ∞, laterally inserted at greater or less height; style simple, tubular, apex stigmatiferous, subentire or minutely 3–5-denticulate. Capsule 3–5-valved, incompletely or subcompletely 3–5-locular; exocarp loculicidal, separating from alternate-valved, membranous or pergamentous endocarp. Seeds ∞, cochleate-reniform or spiral, exterior sprinkled with wool or long hairs, sometimes short and remote (*Amoreuxia*); testa crustaceous or corneous, before apex of cotyledons perforated by pores inwardly stopped by obturator; albumen fleshy; embryo fornicate or incurved axile; cotyledons ovate or oblong, sometimes uncinate; radicle terete, incurved. — Trees, shrubs, or more rarely herbs with tuberous rhizome full of yellow juice; leaves alternate, palmatifid or digitate; flowers (handsome) in simple or ramified racemes, terminal or lateral to upper leaves (*America, Asia, West. Africa, and Trop. Australia*). See p. 297.

XXXII. CISTACEÆ.

This small family has taken its name from the Cistuses[1] (figs. 344, 345), which have regular flowers generally hermaphrodite, with a receptacle in the form of a surbased cone, bearing from below

Cistus (*Eucistus*) *creticus*.

Fig. 344.
Floriferous branch.

upwards, the perianth, androceum, and gynæceum. In the most wide-spread species of this genus, such as *Cistus creticus* (fig. 344), *crispus*, *albidus*, *purpureus*, *parviflorus*, &c., we observe first a calyx formed of five[2] sepals more or less unequal, arranged in quincuncial

[1] *Cistus* T., *Inst.*, 259, t. 136.—L., *Gen.*, n. 673.—Adans., *Fam. des Pl.*, ii. 443.—J., *Gen.*, n. 673.—Gærtn., *Fruct.*, 370, t. 76.—Lamk., *Dict.*, ii. 12; Suppl., ii. 271; *Ill.*, t. 477.—Pourr., *Hist. des Cistes* (ex Clos, in *Mém. Acad. Toul.* et *Bull. Soc. Bot. de Fr.*, v. 291).—Dun., in DC., *Prodr.*, i. 263.—Turp., in *Dict. Sciences Nat.*, Atl., t. 190.—Spach, in *Ann. Sc. Nat.*, sér. 2, vi. 357; *Suit. à Buffon*, vi. 84.—Endl., *Gen.*, n. 5028.—Payer, *Organog.*, 15, t. 3; *Fam. Nat.*, 144.—B. H., *Gen.*, 113, n. 1.—Willk., *Ic. Hispan.*, ii. t. 75–99.—Pl., in *Bull. Soc. Bot. de Fr.*, ix. 509.—Clos, in *Bull. Soc. Bot. de Fr.*, ix. 519.—Schnizl., *Icon.*, fasc. ix. t. 188.

[2] There are only three in *C. ladaniferus* L., *cyprius* Lamk. and *laurifolius* L., types of the genus *Ladanium* Spach (*loc. cit.*, 366, t. 17, figs. 1–4).

præfloration in the bud.[1] The petals, the same in number, are alternate, opposite, or in an intermediate position,[2] sessile or nearly so, contorted in the bud;[3] the whole forms a rosaceous corolla, which falls very soon after opening. The androceum is composed of an indefinite number of hypogynous stamens, with free filaments and anthers dehiscing by two longitudinal clefts, marginal or slightly introrse.[4] The free superior gynæceum is formed of a sessile one-celled ovary, with five parietal placentas superposed to the sepals, and more or less prominent in the interior of the cell.[5] Each placenta bears an indefinite number of ovules, orthotropous or nearly so,[6] each provided with a more or less elongated funicle. The ovary is surmounted by a style of variable length, the summit being swollen and charged with stigmatic papillæ.[7] The fruit, accompanied at its base by the persistent calyx, is a capsule which separates at maturity into five valves, and opens from above downwards by five clefts more or less prolonged. Each valve bears within upon the midrib a polyspermous placenta. The seeds contain under their coats[8] a farinaceous or subcartilaginous albumen, surrounded by an excentric embryo, with radicle opposite the hilum, and cotyledons more or less large and flat, spirally rolled. The Cistuses proper[9] are frutescent or suffrutescent plants, often bearing soft and viscous hairs. The leaves are generally opposite, principally in the lower parts of the plant, simple, entire, exstipulate. The flowers are terminal or solitary, or more usually grouped at the summit of the branches in few-flowered cymes; the corolla is pink or rather purple.

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[1] The sepals 1 and 2 are quite exterior. The three others, considered by some as the only sepals, are besides contorted at a certain age. Sometimes the calyx is accidentally formed of two series of three leaves each.

[2] SPACH admitted "the petals never alternate with the sepals." PAYER in the species observed by him, has seen, he says, an exact alternation. PLANCHON has confirmed both the accounts, the latter being the less frequent.

[3] The direction of the twisting is often opposite in the corolla and calyx; but this is far from being constant.

[4] The pollen of the *Cistaceæ* which have been studied, is ellipsoidal with three folds, and in water spherical with three papillæ. (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 329.)

[5] SPACH has seen that the placentas adnate to the edge of the partitions "are very clearly distinguished from these, and should not be confounded with them.

[6] The funicle is inserted either at the base of the ovule or at a greater or less height on the sides. The ovule has a double coat. That of *C. creticus* has been described by J. G. AGARDH (*Theor. Syst. Plant.*, t. 16, figs. 17–19).

[7] The style is a tube dilated towards its apex. The summits of the placentas spread over the interior of the tube in the form of narrow bands alternating with the ovary cells, and finish by dilating a little in as many stigmatiferous lobes.

[8] It is composed of three layers, the middle one being the least resistant and most coloured.

[9] Sect. *Eucistus.*—Gen. *Cistus* SPACH, *loc. cit.*, 367. This section should include the *Erythrocistus* of DUNAL, except *C. symphytifolius.*

There are some species of Cistus, such as *C. symphytifolius*,[1] whose two exterior sepals are small and recurved outwardly, and whose style, much longer than the stamens, is slightly geniculate at the base; it has been proposed to make of them a genus under the name of *Rhodocistus*.[2] Their petals are red, as in the *Cistus* proper. In other species of the genus the corolla is white and the style very short. They had formerly been mixed in a section called *Ledonia*[3] (fig. 346); they have since been distinguished into three other genera under the names of *Ledonia*,[4] *Ladanium*,[5] and *Stephanocarpus*.[6] The genus *Cistus*, thus circumscribed, includes some twenty European, African, and Asiatic species,[7] most of them from the Mediterranean region.

Cistus (*Stephanocarpus*) *monspeliensis*.

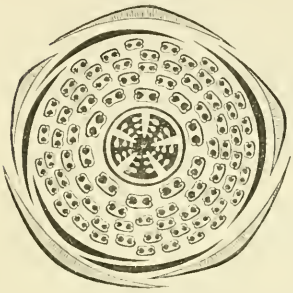

Fig. 345. Diagram.

Helianthemum lasiocarpum.

Fig. 346. Inflorescence.

The Helianthemums[8] (figs. 346–348), formerly included in the genus *Cistus*, can scarcely be separated from it, except by artificial means. Instead of five placentas they have generally but three; and their capsule is divided into three valves instead of five. The inflorescence is really in cymes, but they generally resemble racemes or spikes.[9] The embryo is generally hook-shaped, or at least one of those defined in technical language as *biplicatus* or *circumflexus*. In

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[1] Lamk., *Dict.*, ii. n. 9.—*C. vaginatus* Ait.—*C. candidissimus* Dun.

[2] Spach, *loc. cit.*, 367 (*R. Berthelotianus*).

[3] Dun., *loc. cit.* (nec Spach).

[4] Spach, *loc. cit.*, 369 (nec Dun.).

[5] See p. 337, note 5. The gynæceum may here have as many as ten cells.

[6] Spach, *loc. cit.*, 368.

[7] Reichb., *Ic. Fl. Germ.*, iii. t. 36–40.—Bernh., in *Flora* (1828), 688.—Webb, *Phy. Canar.*, t. 12.—Gren. & Godr., *Fl. de Fr.*, i. 161.—*Bot. Mag.*, t. 43, 112, 264, 5241.—Walp., *Rep.*, i. 206; ii. 765; *Ann.*, i. 64; vii. 204.

[8] *Helianthemum* T., *Inst.*, 248, t. 128 (part.).—Pers., *Syn.*, ii. 75.—Dun., in DC. *Prodr.*, i. 266.—Spach, in *Ann. Sc. Nat.*, sér. 2, vi. 360; *Suit. à Buffon*, vi. 15.—Endl., *Gen.*, n. 5029.—Payer, *Organog.*, 15, t. 3; *Fam. Nat.*, 145.—Willk., *Ic. Hisp.*, ii. t. 103–158.—A. Gray, *Gen. Ill.*, t. 87.—B. H., *Gen.*, 113, n. 2. Lem. & Dcne., *Tr. Gén.*, 429.—*Cistus* L., *Gen.*, n. 673 (part.).

[9] Because the cymes often become uniparous by abortion, and the axes of successive generations are placed end to end as in a sympode, so as to simulate one single axis (fig. 346).

Halimium,[1] which consists of species, some allied to the Helianthemums and others to the Cistus, and which are a connecting link between the two genera, the embryo is often disposed like that of the latter, although the gynæceum is formed of three carpels. The Helianthemums are herbaceous or suffrutescent plants, with opposite or alternate leaves, stipulate or exstipulate,[2] inhabiting Europe, the Mediterranean region and Western Asia, the Isles of the Western Coast of Africa, and the two Americas. Some have described more than a hundred species;[3] others have reduced this number to about a quarter.[4] They have been divided into seven or eight genera,[5] five of which we preserve as subgenera or sections. The flowers are generally yellow or white, or more rarely pink. In three or four species, *H. canadense*, *corymbosum*, and *glomeratum*,[6] the flowers are of two sorts, some polyandrous, and others triandrous or apelatous. In *H. glomeratum* all the flowers are apelatous and oligandrous; it has been proposed to make a genus of it, *Tæniostema*,[7] the name being derived from the stamens,[8] and which would serve to connect *Helianthemum* proper to the other two generically lessened types which follow.

Helianthemum lasiocarpum.

FIG. 347. Seed (5/1).

FIG. 348. Long. sect. of seed.

Hudsonia and *Lechea* may be considered as reduced types of the

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[1] *Helianthemi* sect. DUN., in DC., *Prodr.*, i. 267. — Gen. *Halimium* SPACH, *loc. cit.*, 365 (incl.: *H. lasianthum*, *algarvense*, *umbellatum*, *Cistus Libanotis*, *rosmarinifolius*).

[2] CLOS considered the two exterior sepals of *Helianthemum* as being of the nature of stipules. In *Helianthemum* the want of alternation between the pieces of the corolla and calyx is generally more pronounced than in the Cistuses. PAYER (*Organog.*, 16) assigns the following position to the petals:—"One before sepal 4, and two before each sepal 3 and 5. In considering the side of the flower superposed to the last bract as anterior, there are then four anterior petals superposed in pairs to two sepals, 3 and 5, and one posterior petal superposed to sepal 4."

[3] DUN., *loc. cit.*, 266.

[4] SPACH only admits twenty-seven. — REICHB., *Ic. Fl. Germ.*, iii. t. 25–35.—WEBB, *Phyt. Canar.*, t. 12 B, 13, 13 B.—BOISS., *Fl. Or.*, i. 439.—GREN. & GODR., *Fl. de Fr.*, i. 167.—C. GAY, *Fl. Chil.*, i. 202.—A. GRAY, *Man.*, ed. 5, 80.—CHAMP., *Fl. S. Unit. St.*, 35. —WALP., *Rep.*, i. 208; v. 58 *b*; *Ann.*, i. 64; ii. 63; iv. 231; vii. 205.

[5] Especially *Euhelianthemum*, which is distinguished by an orthoplocate embryo, *Tuberaria* DUN. (*H. guttatum*), and *Rhodax*, SPACH, which have one, a circumflex embryo, the other diplecolobed.

[6] Type of the genus *Heterememeris*, SPACH, *loc. cit.*, 270.

[7] SPACH, *loc. cit.*, 374.

[8] They have a linear spathulate filament and a suborbicular adnate very small anther. In *Fumana* section of the genus *Helianthemum* (DUN., *loc. cit.*, 274), of which a distinct genus has also been made (SPACH, *loc. cit.*, 359, t. 16; —ENDL., *Gen.*, n. 5027), the exterior stamens are sterile and moniliform. The ovules are not orthotropous, but incompletely anatropous, as in some other species of the group. ("Nobis erit subgen. *Helianthemi*." B. H., *loc. cit.*, 114.)

genus *Cistus*. In *Hudsonia*[1] there is, with the same perianth and androceum as in *Cistus*, three carpels and three placentas; but upon each of these only two ovules, similar to those of *Helianthemum*. This small genus contains three species,[2] of North America, with frutescent or subfrutescent stem, small alternate imbricated leaves, analogous to those of the heather (Fr., *Bruyère*), and small yellow flowers, terminal, solitary, pedunculate, near together on small gem-

Lechea mexicana.

FIG. 350.
Long. sect. of flower ($\frac{6}{1}$).

FIG. 349.
Floriferous branch.

FIG. 351.
Flower with perianth taken away.

miform branches. *Lechea*[3] has only trimerous flowers, sometimes dimorphous, apetalous, with few stamens, an ovary with biovulate placentas, and a style with three stigmatiferous fimbriate divisions. The four or five known species[4] are also of North America, herbaceous or suffrutescent, with flowers disposed in racemes of cymes or

[1] L., *Mantiss.*, n. 1263.—J., *Gen.*, 162.—GÆRTN. F., *Fruct.*, iii. 152, t. 407.—LAMK., *Ill.* t. 407.—DUN., in DC., *Prodr.*, i. 284.—SPACH, *loc. cit.*, 372; *Suit. à Buffon*, vi. 113.—ENDL., *Gen.*, n. 5031.—A GRAY, *Gen. Ill.*, t. 90.—B. H., *Gen.*, 114, n. 3.

[2] A. GRAY, *Man.*, ed. 5, 81.—CHAPM., *Fl. S. Unit. St.*, 36.—WALP., *Rep.*, i. 213.

[3] L., *Gen.*, n. 109.—J., *Gen.*, 303.—GÆRTN., *Fruct.*, ii. 222, t. 129.—DC., *Prodr.*, i. 285.—SPACH, *loc. cit.*, 371.—ENDL., *Gen.*, n. 5030.—PAYER, *Fam. Nat.*, 146.—A. GRAY, *Gen. Ill.*, t. 88, 89.—B. H., *Gen.*, 114, n. 4.—*Lechidium* SPACH, in *Ann. Sc. Nat.*, sér. 2, vi. 372.

[4] LAMK., *Ill.*, t. 281, fig. 3 (*Gaura*).—A. GRAY, *Man.*, ed. 5, 81.—TORR. & GRAY, *Fl. N.-Amer.*, i. 152.—CHAPM., *Fl. S. Unit. St.*, 36.—SPACH, in *Comp. to Bot. Mag.*, ii. 282, 286.—WALP., *Rep.*, i. 212; v. 58 *b*.

glomerules. In *L. Drummondii*, raised to the rank of a genus, under the name of *Lechidium*, the partitions are incomplete, and the placentas thicker than in the other species, and persistent after the dehiscence of the fruit.

The Cistuses formed, according to ADANSON,[1] in 1763, a family between "the Poppies and Ranunculuses;" he included in it a great many *Bixaceæ*, *Hipericaceæ*, and *Clusiaceæ*, *Sarracena*, the Fennel flowers, &c. A. L. DE JUSSIEU[2] much reduced the limits of the family in placing there, on the one hand, the Cistuses and the Helianthemums, and on the other hand, as *genera affinia*, almost all the *Violaceæ* known to him. He ranged *Hudsonia* among the Heaths, and *Lechea* beside the Flaxes. In 1824, DUNAL[3] defined the family as most authors[4] have done since his time, and as we have done in enumerating the four genera—*Cistus*, *Helianthemum*, *Hudsonia*, and *Lechea*.[5] LINDLEY,[6] in 1846, added *Cochlospermum*, a genus really very nearly allied to the four preceding, more nearly allied still to *Bixaceæ* and *Ternstræmiaceæ*. The number of species in this group do not seem to be more than sixty: these are known in Australia, South Western Asia, and in middle and South Africa. The Cistuses are Mediterranean. The Helianthemums, inhabiting the same regions, extend to the islands of Western Africa, in Asia, as far as the Punjaub, and there are some in the temperate regions of America. All the known species of *Hudsonia* and *Lechea* are from North America.

There is a great affinity between *Cistaceæ* and *Dilleniaceæ;* so much so, in external characters, that the most cultivated species of *Hibbertia*[7] among us singularly resemble the Cistus, as do also a great many small species of Australian *Candollea* and *Hibbertia*. The stamens and petals are often the same in both groups, as to form and

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[1] *Fam. des Pl.*, ii. 434, Fam. 64.

[2] *Gen.*, 294, Ord. 20 (*Cisti*).

[3] In DC., *Prodr.*, i. 263, Ord. 15 (*Cistineæ*).

[4] ENDL., *Gen.*, 903, Ord. 188 (*Cistineæ.*)—SPACH, in *Ann. Sc. Nat.*, sér. 2, vi. 257, 357; *Suit. à Buffon*, vi. 1-114 (*Cistaceæ*).—B. H., *Gen.*, 112, Ord. 14 (*Cistineæ*).

[5] These genera are however, we think, very artificial, not clearly defined, generally with links insensibly connecting them with each other, which proves that this small group is a most natural one, and might be generically divided and multiplied at will.

[6] *Introd.*, lxix. (1836); *Veg. Kingd.*, 349, Ord. 122.

[7] *H. volubilis* ANDR. (Vol. i. figs. 128–130).

colouring. It is however certain, the mode of insertion, and the organization of the ovules are very different in *Cistaceæ* and *Dilleniaceæ;* if not, we might consider the former as representing a form of carpels united edge to edge in a unilocular ovary, while the latter would have, in general, independent and unilocular carpels, and would be to *Cistaceæ* what *Illiceæ* is to *Canelleæ*, *Anoneæ* to *Monodoreæ*, *Astrocarpeæ* to *Resedeæ*, &c. The false racemes of *Helianthemum*, compared with the unilateral inflorescence of certain species of *Hibbertia*, would singularly complete the analogy between the two groups. On the other hand, *Cistaceæ* has been placed by most authors near *Capparidaceæ*, *Resedaceæ*, and *Bixaceæ*. They have not the habit, corolla, anatropous or campylotropous ovules, nor the seeds of either of them. They cannot always be absolutely distinguished from all the *Capparidaceæ*, by the presence of an albumen, since certain of them are also provided with it. But in *Cistaceæ* it is either farinaceous or subcartilaginous. The orthotropy of the seeds, and the more or less pronounced curvature of the embryo, often convolute and conduplicate, serves, however, to distinguish *Cistaceæ* from *Bixaceæ*. The latter have sometimes a calyx, with unequal sepals, with two small bractiform and exterior leaves, as in so many species of *Helianthemum*, such as *Ryania*, which is, moreover, destitute of petals. The *Violaceæ* are correctly considered as nearly allied to *Cistaceæ;* but they have either irregular flowers, or when the corolla is regular, a definite number of stamens and ovules, and seeds of quite a different character. The polypetalous *Canelleæ* have almost the same organization as the *Cistaceæ* as to perianth and placentation; but their monadelphous stamens, fleshy fruit, and anatropous seeds are totally different in character. There are also analogous resemblances between *Luxemburgieæ* and *Cistaceæ;* but the former has a characteristic foliage, an eccentric gynæceum, and anatropous ovules. We may say, in short, that *Cistaceæ*, a syncarpous form of *Dilleniaceæ ?*, is a connecting link also between *Bixaceæ* and *Violaceæ*. *Turneræ*, which we have, moreover, connected with *Bixaceæ*, is also very analogous to the *Cistaceæ* by its corolla, mode of placentation, and capsular fruit; it is distinguished from them particularly by the definite number of its stamens, and often also, but not constantly, by the difference in their mode of insertion.

Very few species supply useful productions. The most celebrated are those which secrete *ladanum* or *labdanum*, a resinous balsamic substance, with strong odour, more or less like that of ambergris, with a flavour slightly aromatic and bitter, much esteemed formerly as stimulating, resolvent, anti-ulcerous, anti-catarrhal, and emmenagogue. It came originally from Candia or Crete, where it was collected at first by combing the beard of the goats which browsed on the leaves of the Cistuses, especially *C. creticus*[1] (fig. 344); it is secreted by the hairs formed of numerous superposed cells, on the surface of which it may be seen borne in the state of small fluid drops.[2] It is now collected by passing over the Cistuses a kind of instrument formed of leather thongs placed on the top of a common handle, like the teeth of a rake or comb.[3] These thongs are afterwards scraped with a knife, and the resin is enclosed in bladders, where it increases in consistence. It often becomes pitchy, of a dark brown; gradually it loses its water, and becomes lighter, more brittle, and greyish. It is rarely pure in commerce, but generally adulterated with ordinary resin, or mixed with sand and earth,[4] which causes it to be only partly, instead of entirely, soluble in alcohol. It is also almost disregarded now by doctors, although formerly considered a powerful remedy, and is scarcely used except by perfumers in the preparation of cosmetics. There is another *ladanum*, which comes from Spain. It is said to be obtained by boiling the principal parts of *C. ladaniferus*.[5] It is blackish like pitch or storax.[6] The *Helianthemums*, especially *H. vulgare*,[7] are considered astringent and vulnerary.

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[1] L., *Spec.*, 737.—Jacq., *Ic. Rar.*, i. t. 95.—DC., *Prodr.*, i. 264, n. 6.—Nees, *Pl. Med.*, ii. t. 426.—Mér. & Del., *Dict. Mat. Méd.*, ii. 299; iv. 17.—A. Rich., *Elém.*, éd. 4, ii. 377, t. 79.—Guib., *Drog. Simpl.*, éd. 6, iii. 666.—Lindl., *Fl. Med.*, 131; *Veg. Kingd.*, 350.—Rév., in *Fl. Méd. du* xix^e^ *Siècle*, i. 349, t. 33.—Pereira, *Elem. Mat. Med.*, ed. 4, ii. p. ii. 575.—Endl., *Enchirid.*, 467.—Rosenth., *Syn. Pl. Diaph.*, 655.—*C. vulgaris* Spach, in *Ann. Sc. Nat.*, sér. 2, vi. 368.

[2] Ung. & Kotsch., *Die ins. Cypern*, cap. vi. Authors go so far as to think that it is the Cistus which gave its name to the island of Cyprus (ex anal., in *Bull. Soc. Bot. de Fr.*, xii. Bibl., 35).

[3] T., *Voy. au Levant*, i. 84.

[4] This must have been the case with that analysed by Pelletier (in *Bull. Pharm.*, iv. 503).

[5] L., *Spec.*, 737.—DC., *Prodr.*, i. 266, n. 27.—Nees, *loc. cit.*, t. 425.—*Ladanum officinarum* Spach, *loc. cit.*, 367.—*Ledon* Clus., *Hist.*, i. 78, ic (ex DC.).

[6] Guib., *loc. cit.* These are cited as producing ladanum; in Spain, *C. cyprius* Lamk., *laurifolius* L., and *Ledon* Lamk.; in Greece, *C. monspeliensis* L. (fig. 345). Spiral *ladanum*, or *in tortis* of the pharm., is generally all adulterated. *C. villosus* L., which is used in Greece in preparing infusions similar to tea, and also as a drug, is the *Cistus mas* of the ancients. (Their *C. fœmina* was *C. salvifolius* L.).

[7] Gærtn., *Fruct.*, i. 371, t. 76.—Dun., in DC., *Prodr.*, i. 280, n. 86.—Rosenth., *op. cit.*, 657 (*Herba Helianthemi* s. *Chamæcysti vulgaris* Off.).—*H. variabile* Spach, *loc. cit.*, 362.—*H. canadense* Michx., is employed as a depurative and as anti-scrofulous.

GENERA.

1. **Cistus** T.—Flowers regular, generally hermaphrodite; receptacle rather convex. Sepals 5, more rarely 3, unequal; 2 exterior often much smaller; 3 interior usually convolute; præfloration usually imbricated. Petals 5, more or less opposite sepals, sometimes alternate, very shortly unguiculate, imbricate or usually contorted, very fugacious. Stamens ∞, hypogynous; filaments free, exterior sometimes antherless; anthers 2-locular; cells longitudinally introrsely or laterally dehiscing. Germen free sessile, 1-locular; septa parietal 3 or 5, alternipetalous, more rarely 6–12, more or less prominent, sometimes inwardly contiguous; style simple, very short or almost wanting, sometimes cylindrical elongated, apex dilated and divided into short lobes (apices of septa) more or less conspicuous stigmatiferous; ovules on each placenta 2, or oftener ∞, funicle often long extended; orthotropous or very rarely more or less adnate to funicle subanatropous. Capsule dehiscent from apex to a greater or less distance into valves equal in number to and bearing placentas at middle within. Seeds ∞; testa crustaceous (oftener damp exterior mucilaginous); albumen farinaceous or subcartilaginous; embryo subcentral or oftener excentric, curved convolute, 2-plicate or conduplicate, more rarely suberect; cotyledons flat or semiterete; radicle remote from hilum or more or less near (adnate to funicle).—Herbs, undershrubs, or shrubs; leaves opposite or sometimes alternate, simple, subentire; stipules 0, or small, sometimes foliaceous; flowers solitary terminal or falsely racemose (cymose) secund (*Southern and Mediterranean Europe, Mediterranean Africa, South Western Asia*). See p. 330.

2. **Helianthemum** T.—Flowers nearly of *Cistus*, some 2-morphous; sepals 3–5. Petals 5, or more rarely 3, sometimes 0. Stamens ∝, exterior sometimes sterile (*Fumana*). Germen 3-merous; placentas or semisepta 3; style often articulate, form longitudinal and varied, apex stigmatiferous capitate or cristate-3-lobed. Capsule 3-valved. Seeds ∞; embryo uncinate, 2-plicate or circumflexed.—

Herbs or undershrubs, often decumbent at base; leaves alternate or opposite, stipulate or exstipulate; flowers cymose, usually 1-parous by abortion, in false racemes, or more rarely umbelliform (*Europe, N. Africa and Western Islands, W. Asia, Temperate America, both Continents*). See p. 332.

3. **Hudsonia** L.—Flowers nearly of *Helianthemum;* petals 5, very fugacious. Stamens 3. Placentas 3, 2-ovulate. Capsule included in connivent calyx, 3-valved. Seeds 1 or few; embryo slender uncinate-circinate.—Cæspitose undershrubs, or small shrubs (ericoidal); leaves small, acerose, imbricated; flowers small (*North America*). See p. 333.

4. **Lechea** L.—Flowers 2-morphous; petals in fertile flowers 3, small, narrow. Stamens few. Placentas of germen 3, 2-ovulate; style usually short, stigmatiferous fimbriate, 3-merous at apex. Capsule 3-valved; valves finally separating from placenta or semisepta, membranous or firmer (*Lecheoides*); seeds few; embryo subcentral, nearly straight or subspiral.—Herbs or undershrubs many stemmed, thin; flowers very small (*North America*). See p. 333.

XXXIII. VIOLACEÆ.

I. PAYPAYROLA SERIES.

The Violets (figs. 352, 363–369), which have given their name to this family, are not, however, the regular type. This is found in *Paypayrola*[1] (figs. 353–355), which has upon the receptacle a pentamerous imbricated calyx, and five alternate petals, subequal among

Viola odorata.

FIG. 352.
Habit.

themselves, also imbricated in the bud. Below they are formed into a tube, but without adhering, beyond which the limbs spread more or less widely. The stamens, five in number, alternating with the petals, have their filaments united into a short tube, and two-celled introrse anthers dehiscing by two longitudinal clefts. The gynæceum is superior, composed of a unilocular ovary, surmounted

[1] AUBL., *Guian.*, i. 249, t. 99.—J., *Gen.*, 427.—POIR., *Dict.*, v. 118; Suppl., iv. 337.—LAMK., *Ill.*, t. 125.—TUL., in *Ann. Sc. Nat.*, sér. 3, vii. 368.—B. H., *Gen.*, 118, n. 9.—*Wibelia* PERS., *Syn.*, 210.—SPRENG., *Syst.*, i. 794 (nec BERNH., nec HOPP.).—*Periclistia* BENTH., in *Hook. Journ.*, iv. 108.

by a style swollen and stigmatiferous at the apex. In the ovary cell are seen three parietal placentas, the two anterior each supporting a

Paypayrola guianensis.

FIG. 353.
Flower ($\frac{3}{1}$).

FIG. 355.
Flower without perianth.

FIG. 354.
Long. sect. of flower.

various number of anatropous ovules.[1] The fruit is a three-valved capsule, which opens elastically in the intervals of the placentas, the

Amphirrox longifolia.

FIG. 356.
Flower ($\frac{2}{1}$).

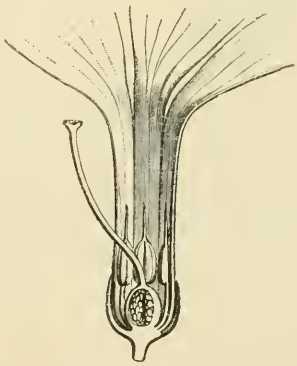

FIG. 357.
Long. sect. of flower ($\frac{4}{1}$).

cartilaginous endocarp[2] separating at the same time from the exocarp. The middle of each valve bears rounded seeds, the coats covering an

[1] With double coat.

[2] Thin, sharp upon the edges.

embryo surrounded by a fleshy albumen. These are trees of tropical America; four or five species of them are known.[1] The leaves are alternate, simple, entire, accompanied by two lateral stipules; the flowers are disposed in spikes or racemes at the summits of the branches, and the axils of the leaves.

Amphirrox (figs. 356, 357) only differs from *Paypayrola* by its stamens, the filaments of which are free, and the anthers surmounted by a pointed prolongation of the connective. *Isodendrion*, consisting of shrubs from the Sandwich Isles, have the free stamens of *Amphirrox*, and the non-apiculate anthers of *Paypayrola*. The stigmatiferous summit of their style projects on one side, instead of being terminal; the placentas support two or four ovules each, and there is no deduplication of the pericarp at maturity.

Rinorea (figs. 358–362) may be considered as the type of a distinct subseries, because the regular or slightly irregular corolla is formed

Rinorea physiphora.

Fig. 358.
Flower ($\frac{5}{1}$).

Fig. 360.
Stamen, internal face.

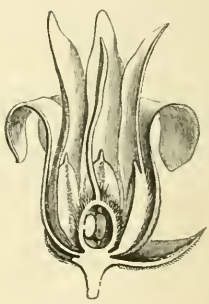

Fig. 359.
Long. sect. of flower.

of petals quite distinct to the base, and not adhering to each other at this point. The stamens are free, or the filaments united for a variable distance; their back is sometimes bare, sometimes appendiculate; and the connective is prolonged above the anthers in a plate of variable form. On each of the three parietal placentas one or several ovules are inserted; the fruit is a three-valved capsule, with seeds smooth, or furnished with a cottony down.

In a *Rinorea* of Ceylon, distinguished as a genus under the name of *Scyphellandra*, the very small flower has a sort of disk, represented by five scales, each corresponding to the back of an anther.

[1] Tul., *loc. cit.*, 370; xi. 153.—Walp., *Rep.*, v. 107; *Ann.* i. 60; ii. 67.

Glœospermum, which we have only been able to separate from *Rinorea* as a section, has a fruit more or less fleshy without, and perhaps indehiscent at maturity. Its seeds are clothed outwardly with a viscous layer of cells, transforming themselves in the *Rinorea* of the section *Lasiospermum* into woolly hairs, the pericarp being, moreover, in this section of the same consistence as in *Glœospermum*.

Rinorea physiphora.

FIG. 361. Transverse sect. of stamen ($\frac{5}{1}$).

FIG. 362. Fruit ($\frac{3}{1}$).

The fruit of *Leonia* is a berry, and the flowers analogous to those of *Rinorea ;* but their monadelphous stamens are destitute of all pointed prolongation of the connective.

Beside *Leonia* are placed the two genera *Melicytus* and *Hymenanthera*, very nearly allied to each other, and the polygamous, regular, and pentamerous flowers of which are remarkable for their anthers surmounted by a prolongation of the connective, and lined without by a tongue, attached more or less low upon its back. The fruit is an indehiscent berry in *Melicytus* and *Hymenanthera*, which are distinguished from each other : the first, by subsessile anthers, and three placentas uni- or pluriovulate ; the latter, by short and monadelphous filaments, and two uniovulate placentas.

II. VIOLET SERIES.

The genus *Viola*[1] (figs. 352, 363–369), several species of which are known in our country, the Pansy,[2] for example, or the sweet Violet,[3] includes plants having hermaphrodite irregular flowers, with convex receptacle. The calyx is formed of five sepals, subequal among

[1] *Viola* T., *Inst.*, 419, t. 236.—L., *Gen.*, n. 1007 (part.).—ADANS., *Fam. des Pl.*, ii. 389.—J., *Gen.*, 294.—GÆRTN., *Fruct.*, ii. 139, t. 112.—POIR., *Dict.*, viii. 623 ; Suppl. v. 482.—LAMK., *Ill.*, t. 725.—GING., in *Mém. Soc. Hist. Nat. Gen.*, ii. t. 1 ; in DC., *Prodr.* i. 291.—SPACH, *Suit. à Buffon*, v. 501.—ENDL., *Gen.*, n. 5040.—PAYER, *Organog.*, 177, t. 37 ; *Fam. Nat.*, 107.—A. GRAY, *Gen. Ill.*, t. 80.—B. H., *Gen.*, 117, 970, n. 5.—*Erpetion* DC., ex SWEET, *Brit. Fl. Gard.*, t. 170.—*Chrysion* SPACH, *loc. cit.*, 509.—*Mnemion* SPACH, *loc. cit.*, 510.—*Lophion* SPACH, *loc. cit.*, 516.

[2] *V. tricolor* L., *Spec.*, 1326.—DC., *Fl. Fr.*, iv. 808 ; *Prodr., loc. cit.*, 303, n. 81.—GREN. & GODR., *Fl. de Fr.*, i. 182.

[3] *V. odorata* L., *Spec.*, 1324.—DC., *Prodr.*, 296, n. 29.—SM., *Fl. Brit.*, 245.—*V. suavis* BIEB., *Fl. Taur.-Cauc.*, Suppl., 164.

themselves, prolonged below, beneath their insertion, into a sort of membranous plate. Two of them are anterior, two lateral, and the fifth posterior, disposed in the bud in quincuncial præfloration. The corolla, very irregular, is polypetalous, and the pieces of

Viola odorata.

Fig. 363.
Flower.

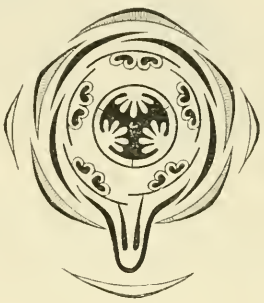

Fig. 364.
Diagram.

Fig. 365.
Sect. of flower ($\frac{2}{1}$).

Fig. 366.
Flower with perianth taken away ($\frac{4}{1}$).

three kinds. The two posterior of one kind, symmetrical to each other, differ in form, and often in colour,[1] from the lateral ones. These covered by the two posterior sepals in præfloration, are also symmetrical to each other; they envelop in the bud the anterior sepal which alone is regular, formed of two equal halves, and which, instead of being flattened in its whole length like the others, dilates a little above its insertion into a hollow spur, more or less wide and arched, making a prominence in the interval of the two anterior sepals (fig. 364). The androceum is formed of five alternipetalous stamens. Each is composed of a two-celled introrse anther, dehiscing by two longitudinal clefts,[2] surmounted by a membranous prolongation of the connective, and of a very short filament broad and flattened. But while in the three posterior stamens the filament bears no projection, in the two others the anterior edge is dilated into a kind of open spur, glandular at the apex, and descend-

[1] Generally darker than the other petals, and of an even colour, while the anterior and lateral petals often paler, of the same colour as each other, or but slightly different, are frequently spotted with purple more or less dark upon a light whitish or yellow ground.

[2] The pollen is ellipsoidal, with three furrows, and in water spherical depressed with three bands without papillæ (*V. biflora, odorata*), or in the form of quadrangular or pentangular prisms (*V. tricolor*), "with folds upon the angles, transparent; in water, ellipsoidal with four or five bands, upon which are large papillæ." (H. Mohl, in *Ann. Sc. Nat.*, sér. 2, iii. 329).

ing into the interior of the spur of the anterior petal.[1] The gynæceum is free and superior; it is composed of a unilocular ovary, surmounted by a style, the apex of which is dilated into a kind of sac or pocket, varying in form according to the species. On the anterior side of this dilatation is found an opening, more or less small, conducting into a cavity lined with stigmatic tissue. The ovary

Viola tricolor.

FIG. 368.
Seed ($\frac{6}{1}$).

FIG. 367.
Dehiscent fruit.

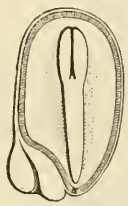

FIG. 369.
Long. sect. of seed.

contains three parietal and multiovulate placentas, two being anterior, and the third posterior. The anatropous ovules[2] are arranged in several ranks, their micropyle being directed towards the placenta. The capsular fruit, generally accompanied at its base by the dried calyx, opens elastically at maturity into three panels, bearing upon the middle of their internal face an indefinite number of seeds.[3] These are provided with a small arillate dilatation, springing principally from the hilum,[4] and enclose under their coats[5] a fleshy albumen, the axis of which is occupied by an elongated straight

[1] So that this receives the nectar secreted in small quantities by the glandular parts of the spurs of the two stamens alternate with the anterior petal.

[2] They have two coats.

[3] In several species there are only fertile fruits in certain flowers produced in summer and autumn, but little visible, apetalous or cryptopetalous; while the spring flowers, with well developed brilliant flowers, are generally sterile.

[4] The aril of *V. tricolor* commences by a slight subcircular thickening of the circumference of the hilum, and it is the same in the other species. The circular cushion, formed of fleshy, turgid, whitish cells, thus produced, afterwards extends much on the side of the raphe, and touches this for a variable length according to the species. At this side it often tapers to a point. In the *Viola odorata* this thickening is afterwards elongated into a cone, with soft lengthened cells on the side of the placenta and of the funicle, which is as though enclosed in it. In several species the cellular hypertrophy reaches the micropyle, which is effaced, and as though lost in the edge of the aril covering it. The arillate cells are very elastic, which assists with the elasticity of the fruit-valve in projecting the ripe seeds.

[5] There are four; that is to say, the middle coat testaceous and crustaceous, and the other two thin, soft, and white. The arillate thickening is produced at the expense of a part of the cells of the outer coat.

embryo.[1] There are some hundred species[2] of this genus, although twice as many have been described. They are herbs, rarely frutescent, two-thirds of which belong to the temperate regions of the northern hemisphere. The others are met with in the mountainous parts of South America, in Australia, New Zealand, and South Africa. The leaves are alternate, entire, or more or less cut, accompanied by two lateral stipules, generally foliaceous, wide, with lamina often deeply divided. The flowers are axillary, pedunculate, generally solitary, with two or three bractlets inserted on the peduncle at a variable height.[3]

Beside the Violets are placed several genera; they have all nearly the same corolla, with a dilatation of varied shape above the base of the inferior petal. They only differ from each other in characters of little value; such as the presence or absence of a prolongation below the insertion of the sepals, the form and consistence of the capsular fruit, the shape of the style and seeds, the consistence of the stems, and the mode of inflorescence.[4] These are the genera *Hybanthus*, *Agation*, *Schweiggeria*, *Anchietea*, *Noisettia*, and *Corynostylis*.

III. SAUVAGESIA SERIES.

The flowers of *Sauvagesia*[5] (figs. 370–375) are hermaphrodite and regular. Upon the conical receptacle are inserted five sepals quincuncially imbricated, and five equal alternate petals, arranged in contorted præfloration in the bud. The androceum is formed of ten

[1] Often greenish.

[2] Cav., *Icon.*, t. 529, 531.—H. B. K., *Nov. Gen. et Spec.*, t. 492, 493.—Reichb., *Ic. Fl. Germ.*, iii. t. 1–23 *bis*.—A. S. H., *Fl. Rem. Brés.*, 275, t. 26; *Fl. Bras. Mer.*, ii. 135.—Wight, *Ill.*, t. 18.—Wight & Arn., *Prodr.*, i. 31.—Royle, *Ill. Himal.*, t. 18.—Hook. f. & Thoms., *Fl. Brit. Ind.*, i. 182.—Pœpp. & Endl., *Nov. Gen. et Spec.*, t. 165, 166.—C. Gay, *Fl. Chil.*, i. 205.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 119.—Griseb., *Fl. Brit. W.-Ind.*, 26.—Chapm., *Fl. S. Unit. St.*, 33.—A. Gray, *Man.*, ed. 5, 76; *Unit. St. Expl. Exp., Bot.*, i. 83.—Benth., *Fl. Austral.*, i. 98.—Hook. f., *Handb. New Zeal. Fl.*, 16.—Boiss., *Fl. Or.*, i. 450.—Harv. & Sond., *Fl. Cap.*, i. 73.—Oliv., *Fl. Trop. Afr.*, i. 15.—Tul., in *Ann. Sc. Nat.*, sér. 5, ix. 299.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 119.—Miq., *Fl. Sum.*, 159.—Oudem., *Viol.*, 7.—Thw., *Cat. Pl. Zeyl.*, 20.—Gren. & Godr., *Fl. de Fr.*, i. 175.—Walp., *Rep.*, i. 213; ii. 766; v. 59; *Ann.*, i. 65; ii. 65; iv. 232; vii. 309.

[3] De Gingins has divided this genus into five sections, founded principally on the form of the style: 1. *Nominium*; 2. *Dischidium* (gen. *Chrysion* Spach); 3. *Chamæmelanium* (gen. *Lophion* Spach); 4. *Melanium* (*Jacea* DC.;—Gen. *Mnemion* Spach); 5. *Leptidium*.

[4] For these differences, which it would be superfluous to repeat, see *Genera*.

[5] L., *Gen.*, n. 286.—J., *Gen.*, 426.—DC., *Prodr.*, i. 315.—A. S. H., in *Mém. Mus.*, xi. 11, t. 6, 7.—Endl., *Gen.*, n. 5050.—Payer, *Fam. Nat.*, 91.—B. H., *Gen.*, 120, n. 18.—Schnizl., *Iconogr.*, fasc. 14, t. 191.—*Sauvagea* Neck., *Elem.*, n. 1118.—Adans., *Fam. des Pl.*, ii. 449.—*Irion* P. Br., *Jam.*, 179, t. 12, fig. 3.

stamens: five fertile, superposed to the sepals, each formed of a short free filament, and a two-celled extrorse anther, dehiscing upon the edges by two longitudinal clefts, and five oppositipetalous, transformed into petaloid plates, contorted in the bud, and forming alto-

Sauvagesia erecta.

Fig. 373.
Fruit ($\frac{3}{1}$).

Fig. 370.
Floriferous branch.

Fig. 374.
Seed ($\frac{5}{1}$).

Fig. 375.
Long. sect. of seed.

Fig. 371.
Flower ($\frac{3}{1}$).

Fig. 372.
Long. sect. of flower.

gether a kind of second interior corolla.[1] Between the androceum thus constituted and the perianth, is generally seen a large number of tongues, often swollen into a gland at the apex, and which have been considered as the elements of a disk.[2] The gynæceum is free,

[1] According to Payer (*loc. cit.*), "this second corolla is only a disk deep fringed or not fringed, as in *Passifloreæ*."

[2] The form of the terminal gland much recalls that of a sterile anther in some species. It is possible that these tongues, often compared to the stipitate or ramified glands of *Pa*[illegible] nothing but the exterior staminodes of a phalanx, of which the inner petaloid plates form also a part only distinguished from the exterior staminodes by their size and petaloid consistence. The glandular supports often have their summits divided into two (rudimentary?) cells.

and superior; it is composed of a unilocular ovary, surmounted by a style swollen at apex, and covered with stigmatic papillæ. In the ovary three parietal placentas are seen, the two posterior each bearing an indefinite number of ascending anatropous ovules, with interior and inferior micropyle.[1] The fruit is a capsule, whose dehiscence is only according to the midrib of the placentas; so that the three valves of the fruit, superposed to the sepals 1, 2, and 3, bear the seeds on their edges. Their coats cover a fleshy albumen enveloping an axile embryo with cylindrical radicle, longer than the cotyledons.

Some dozen species[2] of *Sauvagesia* are admitted. They are glabrous herbs, sometimes suffrutescent at the base. The leaves are alternate, simple, entire or serrulate upon the edges, accompanied by two lateral, pectinate-ciliate stipules. The elegant flowers[3] are axillary and solitary, or collected in terminal racemes. All are natives of the warm parts of America; *S. erecta*, however, is also found in all the tropical regions of the Old World.

Beside *Sauvagesia* are placed two very analogous types from the Indian Archipelago, which perhaps ought not to be generically

Lavradia glandulosa.

FIG. 376.
Flower ($\frac{4}{1}$).

FIG. 377.
Long. sect. of flower.

distinguished. These are: *Schaurmansia*, with oppositipetalous stamens, each represented by a linear or subulate filament, scarcely larger than the numerous tongues of the disk, which they resemble a little in form; and *Neckia*, which, besides the tongues, has a

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[1] They have two coats.

[2] JACQ., *Amer.*, 77, t. 51.—AUBL., *Guian.*, t. 100.—A. S. H., *Pl. Rem. Brés.*, 58, t. 1–4; *Fl. Bras. Mer.*, ii. 109.—MART. & ZUCC., *Nov. Gen. et Spec.*, i. 34, t. 24, 25.—A. GRAY, *Unit. St. Expl. Exp., Bot.*, i. 97.—GRISEB., *Fl. Brit. W.-Ind.*, 26.—SEEM., *Voy. Her., Bot.*, 80.—TR. & PL., in *Ann. Sc. Nat.*, sér. 4, xvii. 275.—TUL., in *Ann. Sc. Nat.*, sér. 5, ix. 320.—WALP., *Rep.*, i. 225; ii. 767; *Ann.*, ii. 68; iv. 236; vii. 220.

[3] White, pink, or violet.

dozen claviform staminodes, united below into a tube with the fertile stamens.

Lavradia (figs. 376, 377), all the species of which are American, has five fertile stamens, and around them a sort of disk (staminodes?) in the form of a cylindrical-conical tube enveloping them completely, the summit being cut into ten small divisions.

This small family was distinguished under the name of *Violaceæ*, in 1805, by De Candolle.[1] Before him *Viola* had been ranged by Adanson[2] with *Geranium*, and with *Cistus* by De Jussieu.[3] The latter knew the types of the regular or subregular flowers of this family, such as *Rinorea*, *Conohoria*, *Paypayrola*; but he classed the two first among the *Berberideæ*, and the latter in the *Genera incertæ sedis*. In 1824, De Candolle,[4] taking part in the researches of de Gingins,[5] united in the order *Violaceæ*,[6] the three tribes, *Violeæ*, *Alsodineæ*, and *Sauvageæ*, comprising nine genera, which we have preserved as distinct: the first, *Corynostylis* (*Calyptrion*), *Noisettia*, *Schweiggeria* (*Glossarrhen*), *Viola*, *Hybanthus* (*Pombalia*, *Ionidium*, and *Pigea*); the second, the *Rinoreas* (*Conohoria*, *Rinorea*, *Alsodeia*, *Pentaloba*, *Ceranthera*, *Physiphora*), *Lavradia*, and *Hymenanthera*; the third, the single genus *Sauvagesia*. Since then the old genera *Paypayrola*,[7] *Amphirrox*,[8] *Melicytus*,[9] and *Leonia*,[10] have been collected in this family. A. Saint-Hilaire established, in 1824, the genus *Anchietea*; Blume, the genus *Schuurmansia*, in 1849. Ultimately, the *Sauvagesia* group was enriched by the type *Neckia*;[11] while Asa Gray, instituting the two genera *Agatea* (*Agation*) and *Isodendrion*, in 1854, made the eighteen which we can preserve in this family.

They include about two hundred and fifty species, of which about two-fifths belong to the genus *Viola*, and a third to *Hybanthus*. The Violet series contains besides some ten species, distributed among the five other genera; and that of the *Sauvagesieæ* about twenty species. The other species, more than sixty in number, belong to the genera with regular or subregular flowers of the *Paypayrola*

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[1] *Fl. Fr.*, iv. 801.
[2] *Hist. des Pl.*, ii. 389.
[3] *Gen.* (1789), 294.
[4] *Prodr.*, i. 287, Ord. 16.
[5] In *Mém. Soc. Hist. Nat. Gen.*, ii. 1.
[6] *Violarieæ* Ging., *loc. cit.*—Bartl., *Ord. Nat.*, 283.—Endl., *Gen.*, 908, Ord. 190.—B. H., *Gen.*, 114, Ord. 15.—*Violaceæ* J., in *Ann. Mus.*, xviii. 476.—Lindl., *Syn.*, 35; *Introd.*, 46; *Veg. Kingd.*, 338, Ord. 116.—*Violeæ* R. Br., *Congo*, 440; *Misc. Works* (ed. Benn.), i. 122.
[7] Aubl., *Guian.* (1775).
[8] Spreng., *Syst.*, *Cur. Post.* (1827).
[9] Forst., *Char. Gen.* (1776).
[10] R. & Pav., *Fl. Per.*, ii. (1798).—Endl., *Gen.*, 738 (? *Myrsineæ*).
[11] Korth., in *Ned. Kruidk. Arch.*, i. (1839).

series. In this the three genera *Paypayrola*, *Amphirrox*, and *Leonia* are American; the three genera, *Isodendrion*, *Melicytis*, and *Hymenanthera* are only found in Oceania. Among the *Sauvagesieæ*, the two genera *Schuurmansia* and *Neckia* belong to the Indian Archipelago; *Lavradia* and *Sauvagesia*, except one species, are confined to America. As to the Violets, the two large genera *Viola* and *Hybanthus* are found in all parts of the world; but the *Agations* are all from Oceania, and America alone possesses the genera *Anchietea*, *Schweiggeria*, *Corynostylis*, and *Noisettia*. The general characters of these three series of this family, are the following:—

I. Paypayroleæ.—Flowers regular or slightly irregular, with free petals often formed into a tube. Androceum isostemonous, without staminodes. Loculicidal capsule or berry.

II. Violeæ.—Flowers irregular, isostemonous. Androceum irregular, without staminodes. Capsule loculicidal.

III. Sauvagesieæ.[1]—Flowers irregular. Corolla polypelatous. Stamens fertile, same in number as the petals. Staminodes interior petaloid, five in number, free or united in a tube, and accompanied outwardly by a number of fertile narrow glandular staminodes. Capsule septicidal.

By the last series, the *Violaceæ* are closely connected with *Ochnaceæ* by the *Luxemburgia* series, from which we shall see how difficult it is to distinguish them clearly. On the other hand, we are scarcely able to distinguish the regular *Violaceæ* with fleshy fruit from the isostemonous *Bixaceæ*.[2] The mode of placentation is the same; but the *Violaceæ* are never perigynous, as most of the *Bixaceæ* with isostemonous androceum are.[3] The *Cistaceæ* differ from the regular *Violaceæ* by the form of their embryo and the usual direction of their radicle with regard to the micropyle. It is only by the genera with irregular corolla, and anterior petal prolonged in a sac or spur, that the *Violaceæ* are clearly distinguished from neighbouring families.[4]

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[1] Bartl., *Ord. Nat.*, 289.—Endl., *Gen.*, 912, Ord. 191.—*Sauvageæ* DC., *loc. cit.* — *Sauvagesiaceæ* Mart., *Consp.*, n. 238 (1835).—Lindl., *Veg. Kingd.*, 343, Ord. 119.

[2] Thus *Tetrathylacium*, ranged by Triana & Planchon among the *Bixaceæ*, has been attributed by Benth. & Hook. (*Gen.*, 119, n. 14) to the *Violaceæ*. *Piperea* or *Guidonia* has also been frequently reckoned among the *Violaceæ*.

[3] "*Violarieæ*, *Bixineis* arcte affines, imprimis androecio 5-mero, antheris introrsum adnatis sæpissime in annulum dispositis distinguendæ, pleræque flore plus minus irregulari, antheris appendiculatis, capsula elastica, etc., insignes." (B.H., *Gen.*, 115.)

[4] A. St.-Hilaire again has connected *Sauvagesieæ* with *Frankenieæ*, but this connexion is not generally admitted. "Tribus *Sauvagesiarum Frankeniaceis* accedit, sed facile sepalis liberis imbricatis, habitu aliisque notis distinguitur." (B. H., *loc. cit.*).

There are five constant characters in this family: the quinary floral type; the presence of free petals covering each other in præfloration; the number of fertile stamens equal to the petals, with which they alternate; the parietal placentation and fleshy albumen of the seeds. Several features of organization, although not constant, are only wanting in a very few cases: these are the alternation of the leaves,[1] the presence of stipules,[2] the indefinite number of ovules,[3] the consistence of the capsule.[4] The other characters vary in the different genera, which they serve to distinguish from each other.

The properties[5] of the plants of this family are tolerably homogeneous. Their roots are emetic to a slight degree in the European species, and decidedly so in those of South America, so that they have been employed as a false Ipecacuanha. The most celebrated in this respect is the plant giving the false Ipecacuanha of Brazil and Guiana, a drug much used[6] in its native country for the same purposes as the true Ipecacuanha, for which it is often substituted; the species should certainly take the name of *Hybanthus Ipecacuanha*.[7] The root of *Cuichunchilli* or *Cuchunchully* of Peru, another powerful emetic, belongs to a second species of the same genus, *H. microphyllus*.[8] *H. scandens*,[9] *Poaya*,[10] *Maytensillo*,[11] *lanatus*,[12] *brevicaulis*,[13]

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[1] Opposite in some species of *Rinorea* and *Hybanthus*.

[2] *Hymenanthera* is destitute of it.

[3] There are one or two on each placenta in some *Rinoreas*.

[4] It is more or less fleshy in *Leonia*, and several species of *Rinorea*.

[5] Endl., *Enchirid.*, 471.—Lindl., *Veg. Kingd.*, 339; *Fl. Med.*, 97.—Guib., *Drog. Simpl.*, éd. 6, iii. 662.—Rosenth., *Syn. Pl. Diaphor.*, 658.

[6] Evacuant, emetic, purgative, antidysenteric; it contains ementine.

[7] *Viola Ipecacuanha* L., *Mantiss.*, 484; *Diss. de Viol. Spec.*, 1; *Mat. Med.*, 484.—*V. Itubu* Aubl., *Guian.*, ii. 808, t. 318.—? *V. diandra* L., *Syst. Veg.*, 669.—*Pombalia Ipecacuanha* Vandell., *Fasc.*, 7, t. 1.—*P. Itubu* Ging., in DC., *Prod.*, i. 307, n. 1. — *Ionidium Itubu* H. B. K., *Nov. Gen. et Spec.*, v. t. 496.—*I. Itouboa* Vent., ex Guib., *op. cit.*, iii. 99, fig. 589. —*I. Ipecacuanha* A. S. H., *Pl. Us. Bras.*, n. 11; *Pl. Rem.*, 307.—*Bot. Mag.*, t. 2453.—Lindl., *Fl. Med.*, 98.—Guib., *loc. cit.*, 97.—Rosenth., *op. cit.*, 660.—Pereira, *Elem. Mat. Med.*, ed. 4, ii. p. ii. 575. (Vulg. *Poaya branca*, *P. da Praja*, Brés.; *Ipekaka*, Guiana). If the synonym of *V. diandra* is correct, this specific name should be rejected on account of the real number of the stamens. *V. Calceolaria* L. (*Ionidium Calceolaria* Vent.) probably belongs to the same species, which presents numerous varieties.

[8] *Ionidium microphyllum* H. B. K., *Nov. Gen. et Spec.*, v. 374, t. 425.—DC., *Prodr.*, i. 310, n. 21.—Lindl., *Fl. Med.*, 98.—Bancr., in *Comp. to Bot. Mag.*, i. 278. In Trop. America this drug, in addition to its evacuant properties, is said to cure obstinate cutaneous affections, especially the elephantiasis of Quito, named by the Spaniards *Malo de San Lazaro*.

[9] Jacq. (ex Rosenth., *op. cit.*, 660).—*Viola Hybanthus* L.—*Ionidium Hybanthus* Vent. (vulg. *Ipecacuanha*, *Pira-aia*).

[10] *Ionidium Poaya* A. S. H., *Pl. Us. Bras.*, t. 9; *Pl. Rem.*, 308 (vulg. *Poaya do campo*). Is used as ipecacuanha in the Minas province.

[11] *Ionidium Maytensillo* Feuill., *Chil.*, iii. 41, t. 28.—Rosenth., *op. cit.*, 661 (according to Hooker, another name for *I. parviflorum* A. S. H.). Considered as a most powerful purgative in Chili.

[12] *I. lanatum* A. S. H., *Fl. Bras. Mer.*, ii. 145, n. 11.

[13] *I. brevicaule* Mart., *Mat. Med. Bras.*, t. 3, 8, fig. 7.—Lindl., *Fl. Med.*, 99. A mild purgative is prepared in Brazil by mixing the pulverized root with sugar and milk.

urticæfolius,[1] *strictus*,[2] *verticillatus*,[3] *parviflorus*,[4] *circæoides*,[5] *bicolor*,[6] *albus*,[7] *guaraniticus*,[8] *setigerus*,[9] *scariosus*,[10] *indecorus*,[11] although less known, are so many species described as belonging to the genus *Ionidium*, and which, possessing qualities more or less decidedly emetic, are employed, like the false or white Ipecacuanhas, in the hottest regions of America. In Madagascar *H. buxifolius*,[12] and in Asia *H. heterophyllus*[13] and *suffruticosus*,[14] are said to yield similar drugs. The European and Amerian Violets have similar virtues, and the roots of *Viola odorata*[15] (figs. 352, 363–366) and those of *V. canina*,[16] *sylvestris*,[17] *palmata*,[18] &c., were formerly used as emetics. In Brazil, *V. cerasifolia*,[19] *gracillima*,[20] *longiflora*,[21] *subdimidiata*,[22] &c., are employed like *Hybanthus*. Other emetic properties are found in *Noisettia longifolia*[23] of Cayenne, and in *Anchietea salutaris*[24] of South Brazil. Saint-Hilaire says that it is not on account of the Europeans, and because of the botanic analogy with our Violets, that the natives of Brazil have learned to know the virtue of this plant, the cultivators of which round Rio Janeiro value the root as purgative, and

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[1] *I. urticæfolium* Mart., *loc. cit.*, t. 4, 9, figs. 17, 18. Used as an emetic in Brazil.

[2] *Viola stricta* Poir., *Dict.*, viii. 648.—*Ionidium strictum* Vent., *Malmais.*, n. 27, not., DC., *Prodr.*, n. 9. A species of the Antilles.

[3] *Viola verticillata* Orteg., *Dec.*, iv. 50.—*Solea verticillata* Spreng., in *Schrad. Journ.*, ii. (1800), 190, t. 6.—*Ionidium polygalæfolium* Vent., *Malmais.*, t. 27.—DC., *Prodr.*, n. 13.—H. B. K., *Nov. Gen. et Spec.*, v. 376, t. 496, of Mexico and the Antilles.

[4] *Viola parviflora* Mut. (ex L. fil., *Suppl.*, 396).—*Ionidium parviflorum* Vent., *loc. cit.*, 27.—DC., *Prodr.*, n. 20.—Rosenth., *op. cit.*, 660, (Peru (?) and Columbia); the white *Ipecacuanha* of Peru is attributed to it. It has sometimes been attributed to the root of *Cuchunchully*.

[5] *Ionidium circeæoides* H. B. K., *Nov. Gen. et Spec.*, v. 379, t. 498.—DC., *Prodr.*, n. 18 (Guayaquil).

[6] A. S. H., *Pl. Rem. Brés.*, 301.

[7] A. S. H., ex Rosenth., *op. cit.*, 661.

[8] A. S. H., ex Rosenth., *loc. cit.*

[9] Vent., ex Rosenth., *loc. cit.*

[10] A. S. H., *Fl. Bras. Mer.*, ii. 144.

[11] According to A. S. H. (*Fl. Bras. Mer.*, ii. 145), of a var. *I. Ipecacuanha*.

[12] *Viola buxifolia* Poir., *Dict.*, viii. 646.—*Ionidium buxifolium* Vent., *loc. cit.*—DC., *Prodr.*, n. 6.

[13] *Polygala frutescens* Burm., *Fl. Zeyl.*, 195, t. 35? *Ionidium heterophyllum* Vent., *loc. cit.*—DC., *Prodr.*, n. 5 (China, Ceylon).

[14] *Viola suffruticosa* Roth., *Nov. Spec.*, 165.—*Ionidium? suffruticosum* Ging., mss. (ex DC., *Prodr.*, n. 24).

[15] See p. 343, note 3.

[16] L., *Spec.*, 1324 (part.).—DC., *Prodr.*, i. 208, n. 44.—Gren. & Godr., *Fl. de Fr.*, i. 17.—Lindl., *Fl. Med.*, 97.—Guib., *op. cit.*, 664.

[17] DC., *Fl. Fr.*, ii. 689.—Reichb., *Ic. Fl. Germ.*, t. 4503.—*V. sylvatica* Fr., *Fl. Hall.*, 64.—Gren. & Godr., *loc. cit.*, 178.

[18] L., *Spec.*, 1323.—DC., *Prodr.*, n. 2. Used as *Ipecacuanha* in N. America.—*V. suavis* Bieb., *ambigua* Waldst. & Kit., *campestris* Bieb., *mirabilis* L., *collina* Bess., *pedata* L. (*digitata* Pursh), *pubescens* Ait., *enneasperma* L., &c., have the same reputation in various parts of Europe and N. America. (See Mér. & Del., *Dict. Mat. Méd.*, vi. 900.—Rosenth., *op. cit.*, 659).

[19] A. S. H., *Fl. Bras. Mer.*, ii. 136, n. 3.

[20] A. S. H., *loc. cit.*, n. 1.

[21] L., *Mantiss.*, 120.

[22] A. S. H., *loc. cit.*, n. 2.

[23] H. B. K., *Nov. Gen. et Spec.*, v. 382, t. 499.—DC., *Prodr.*, i. 290, n. 1.—Rosenth., *op. cit.*, 661.—*Viola longifolia* Poir., *Dict.*, viii. 649.—*Ionidium longifolium* Rœm. & Sch., *Syst.*, v. 398.

[24] A. S. H., *Pl. Us. Bras.*, t. 20; *Pl. Rem.*, 290; *Fl. Bras. Mer.*, ii. 140.—Rosenth., *op. cit.*, 661.—H. Bn., in *Dict. Encycl. des Sc. Méd.*, iv. 299.—*Noisettia pyrifolia* Mart.

as curing chronic skin affections. *Rinorea* presents but slightly different properties. *R. castaneæfolia*,[1] *Cuspa*,[2] and *physiphora*,[3] of South America, are regarded as bitter and astringent; their bark is a febrifuge. The leaves of *R. physiphora* (figs. 358–362) are eaten as a vegetable. *Sauvagesia erecta*[4] (figs. 370–375) is the *Herbe Saint-Martin* of the inhabitants of French Guiana;[5] it is used as mucilaginous and astringent in cases of ophthalmia and diarrhœa. In the Antilles it is employed as a diuretic and antiphlogistic, especially in affections of the urinary channels and of the digestive tube. Our common Violets and Pansies are considered depurative; they are particularly recommended for skin affections. They contain violine, an alkaline principle, bitter, acrid, nauseous, and even poisonous.[6] *L'Herbe de la Trinité*, or *Viola tricolor*[7] (figs. 367–369), and its variety *arvensis*, better known by the name of wild Pansy, is always used in preparing purifying drinks.[8] A large quantity of Violet flowers are consumed in Europe, which often comprise, besides those of *V. odorata*, those of *V. canina*, *sylvestris*, *hirta*,[9] *tricolor*, &c. The seeds of *V. odorata* are purgative, and formerly formed part of double *catholicon*; its petals are laxative, and are sometimes given to children as an aperient.[10] They are especially valued for the dye and coloured syrup prepared from them, and formerly used as reagents of acids and alkalies in the chemist's laboratory; still more so for their delicious perfume, on account of which they are much prized for making bouquets, for the extraction of a precious essence, the preparations of bonbons, aromatic pastes, and slightly pectoral

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[1] *Alsodeia castaneæfolia* Spreng. (ex Rosenth., *op. cit.*, 661).—*Cohonoria castaneæfolia* A. S. H.

[2] *Alsodeia Cuspa* Spreng. — *Cohonoria Cuspa* H. B. K.

[3] *Alsodeia physiphora* R. Br., in *Herb. Banks; Congo*, 21. — *Conohoria Lobolobo* A. S. H.—*Physiphora lævigata* Soland., in *Herb. Banks*.—DC., *Prodr.*, i. 314.

[4] L., *Spec.*, 241 (nec Spreng.) — Jacq., *Amer.*, 77, t. 51, fig. 3.—W., *Spec.*, i. 1185.—R. & Pav., *Fl. Per.*, iii. 11.—H. B. K., *Nov. Gen. et Spec.*, v. 389.—A. S. H., *Pl. Rem. Brés.*, 63, t. 3 a; in *Mém. Mus.*, iii. 215; xi. 102.—DC., *Prodr.*, i. 315, n. 2.—Lindl., *Fl. Med.*, 99; *Veg. Kingd.*, 343.—Endl., *Enchirid.*, 479. — Rosenth., *op. cit.*, 663. — *S. Adyma* Aubl., *Guian.*, t. 100.—*S. nutans* Pers.—*S. peruviana* Rœm. & Sch., *Syst.* v. 437.

[5] It seems to bear the same name in Peru. It is also the *Adima* of the Galibes and the *Yoaba* of the Caribbees.

[6] Boullay, *in Mém. Acad. Méd.*, i. 417.—Mér. & Del., *Dict. Mat. Méd.*, vi. 905.

[7] See p. 343, not. 2. Lindl., *Fl. Med.*, 97.—A. Rich., *Elém.*, éd. 4, ii. 71.—Guib., *Drog. Simpl.*, éd. 6, iii. 665.—Moq., *Bot. Méd.*, 38, fig. 6.—Rév., in *Bot. Méd. du* xix^e^ *Siècle*, iii. 40, t. 3.

[8] The Pansies have hitherto been considered as alexipharmic, and in the United States it is said *V. ovata* Nutt. (*Gen.*, i. 148; DC., *Prodr.*, n. 13), is a remedy for *bite* of the rattlesnake.

[9] L., *Spec.*, 1324.—Sm., *Fl. Brit.*, 244.—DC., *Prodr.*, n. 25.—Rosenth., *op. cit.*, 658.

[10] The bruised leaves of several *Violas*, especially *Viola tricolor*, have the odour of peach-stones; whence the tolerably widely-spread idea that they contained cyanhydric acid.

aromatic conserves. The Romans used Violet Wine, and the sherbets of the Sultan are yet perfumed with the petals of these plants. Their flowers are valued for the ornamentation of gardens, but especially those of the rare Pansies, the cultivated number of which is so considerable.[1]

[1] For all the facts relating to the etymology, history, and cultivation of Pansies see BARILLET, *les Pensées* (Paris, 1869, icon.).

GENERA.

I. PAYPAYROLEÆ.

1. **Paypayrola** Aubl.—Flowers regular or subregular hermaphrodite; receptacle convex. Sepals 5, imbricated. Petals same in number, subequal, free; claws approximate, or cohering in tube; limbs finally patent; præfloration closely imbricated. Stamens 5, alternating with petals; filaments connate in short tube; anthers at the summit of tube sessile muticous, introrse, longitudinally 2-rimose. Germen, free, 1-locular; style straight, apex stigmatiferous; placentas parietal 3, ∞-ovulate. Capsule coriaceous, loculicidal, 3-valved; endocarp cartilaginous separating elastically from exocarp. Seeds ∞, subglobose; testa coriaceous; albumen fleshy; embryo axile straight.—Trees or shrubs; leaves alternate, entire; stipules small; flowers in spikes or terminal and axillary racemes (*Trop. America*). See p. 340.

2. **Amphirrox** Spreng.[1]—Flowers nearly of *Paypayrola;* limb of corolla suboblique. Stamens 5, free; filaments short, flat; connective produced beyond cells in linear-subulate membrane. Other characters as in *Paypayrola*.—Shrubs; leaves alternate or crowded at summit of twigs, entire or serrulate; flowers[2] in terminal pedunculate racemes, 1–3-nate of ∞-flowered cymes (*Trop. America*[3]).

3. **Isodendrion** A. Gray.[4]—Flowers nearly of *Paypayrola;* corolla slightly oblique. Stamens 5, free; connective not produced. Germen 1-locular; style stigmatiferous at clavate, curved, anterior apex; placentas parietal 3; each 3–4-ovulate. Capsule coriaceous, 3-valved; endocarp not separating; seeds obovoid.—Small trees

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[1] *Syst., Cur. Post.*, 51, 99.—Endl., *Gen.*, n. 5046.—Payer, *Fam. Nat.*, 109.—B. H., *Gen.*, 118, n. 8.—*Spathularia* A. H. S., *Pl. Rem. Brés.*, 317, t. 28.—*Braddleya* Velloz., *Fl. Flum.*, 93; Atl., ii. t. 140.—*Amphirroge* Reichb., *Pflanz. Syst.*, 269.

[2] Large, handsome; claws of petals elongated into false tube, approximate; lobes patent.

[3] Spec., 2, 3. A. S. H., *Fl. Bras. Mer.*, ii. 148 (*Spathularia*).—A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 88.

[4] *Unit. St. Expl., Bot.*, i. 92, t. 8, 9.—B. H., *Gen.*, 118, n. 10.

or shrubs; leaves alternate, crowded; stipules 2, lateral; flowers axillary to upper leaves, sometimes to inconstant or caducous bracts, solitary; stipules laterally persistent; pedicels short, bracteolate[1] (*Sandwich Ins.*[2]).

4. **Rinorea** Aubl.[3] — Flowers regular or subregular, 5-merous; sepals imbricated. Petals sessile or very shortly unguiculate, equal or subequal, imbricated. Stamens 5, alternipetalous; filaments free, or more or less connate, appendiculate or naked at back; anthers introrse, 2-rimose; connective produced beyond cells, free, approximate or cohering in rings. Germen 1-locular; placentas 3, 1–∞-ovulate; style straight, stigmatiferous at apex, disk sometimes formed of 5 free glands (*Scyphellandra*[4]). Fruit dry, or sometimes outwardly fleshy or baccate, indehiscent (?) or dehiscing with difficulty (*Lasiospermum*,[5] *Glœospermum*[6]), or much oftener elastically or simply dehiscing (*Eurinorea*), sometimes externally covered with setas very densely and softly echinate (*Medusa*[7]). Seeds few, externally glabrous or rarely gossypinous (*Lasiospermum*); testa coriaceous or crustaceous; albumen fleshy.—Trees, or more frequently shrubs; leaves alternate or more rarely opposite, entire or serrate; stipules small; flowers[8] solitary, or oftener in simple or ramified racemes, sometimes cymiferous, axillary or terminal (*All Trop. and Subtrop. regions* [*except Australia ?*][9]).

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[1] Bracteoles often analogous to sepals, margin paler subscarious, much approximate to genus *Rinorea* sect. *Pentaloba*, differs in petals connivent at base, and connective not produced.

[2] Spec. 2, 3. A. Gray, *loc. cit.*

[3] *Guian.*, i. 235, t. 93 (1775).—J., *Gen.*, 287.—Poir., *Dict.*, vi. 211.—Lamk., *Ill.*, t. 134.—*Riana* Aubl., *loc. cit.*, 237, t. 94.—J., *loc. cit.*,—Poir., *Dict.*, vi. 196; *Ill.*, t. 135.—*Conohoria* Aubl., *loc. cit.*, 239, t. 95.—Lamk., *Dict.*, ii. 96.—*Conoria* J., *loc. cit.*—*Passoura* Aubl., *op. cit.*, Suppl., 21, t. 380.—*Pentaloba* Lour., *Fl. Cochinch.* (1790), 154.—*Physiphora* Soland., mss. (ex R. Br., *Congo*, 440).—*Alsodeia* Dup.-Th., *Hist. Vég. Afr.* (1804), 55, t. 17, 18.—Ging., in *DC. Prodr.*, i. 312.—Spach, *Suit. à Buffon*, v. 497.—Endl., *Gen.*, n. 6047.—Payer, *Fam. Nat.*, 108.—B. H., *Gen.*, 118, 970, n. 11.—*Alsodea* Mart. & Zucc., *Nov. Gen. et Spec.*, i. 27, t. 19-21.—*Cerauthera* Pal. Beauv., *Fl. Owar. et Ben.*, ii. (1807), 10, t. 65, 66.—*Dripax* Nor., mss. (ex Endl.).—*Vareca* Roxb., *Fl. Ind.*, i. 647.—*Prosthesia* Bl., *Bijdr.*, 866.—*Dioryctandra* Hassk., *Relzia*, 125.—*Imhofia* Zoll. & Mor., in *Exs. Jav.* n. 2979 (De gener. nom. prior. cfr. H. Bn., in *Adansonia*, x. fasc. 12).

[4] Thw., *Enum. Pl. Zeyl.*, 21.—B. H., *Gen.*, 120, n. 17.

[5] H. Bn., in *Adansonia, loc. cit.*

[6] Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 128.—H. Bn., in *Adansonia, loc. cit.*—*Gloiospermum* B. H., *Gen.*, 119, n. 13.—Endl., Walp., *Ann.*, vii. 219.

[7] Lour., *Fl. Cochinch.* (éd. 1790), 406.—Endl., *Gen.*, n. 5329.

[8] Small, usually yellow or whitish.

[9] Spec. 40, of which 20 are American. H. B. K., *Nov. Gen. et Spec.*, v. 387, t. 491 (*Conohoria*).—A. S. H., *Pl. Us. Bras.*, t. 10; *Pl. Rem. Brés.*, t. 319; *Fl. Bras. Mer.*, ii. 148 (*Alsodeia*).—Hook., *Icon.*, t. 63 (*Conohoria*).—Moric., *Pl. Nouv. Amér.*, t. 46, 47.—Seem., *Voy. Her., Bot.*, t. 14 (*Alsodeia*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 126 (*Alsodeia*).—Griseb., *Fl. Brit. W.-Ind.*, 26.—Tul., in *Ann. Sc. Nat.* sér. 5, ix. 303 (*Alsodea*).—Miq., *Fl. Ind.-Bat.*, Suppl., i. 160.—Oliv., *Fl. Trop. Afr.*, i. 106 (*Alsodeia*).—Hook. f. & Thoms., *Fl. Brit. Ind.*, i. 186 (*Alsodeia*).—Walp.,

5. **Leonia** R. & Pav.[1]—Flowers hermaphrodite, regular, 5-merous; sepals and petals same in number, longer, alternate, free or coherent at base, præfloration imbricated. Stamens 5, alternipetalous; filaments connate in short tube; anthers short, exappendiculate, inserted at summit of tube, introrsely 2-rimose. Germen free, 1-locular; style short, apex stigmatiferous, entire or scarcely 3-dentate; placentas parietal 3, ∞-ovulate. Berry globose, indehiscent; seeds ∞, subglobose, nidulant in pulp.—Trees; leaves alternate, entire, pellucid-punctuate; flowers small, in axillary or terminal cymes, long ramified-compound (*Trop. and Subtrop. South America*[2]).

6. **Melicytus** Forst.[3]—Flowers subregular polygamous, 5-merous; sepals and longer petals sessile imbricate. Stamens alternipetalous 5; filaments very short, subconnate; anthers introrse, 2-rimose; connective produced at apex in membrane, and dorsally more or less above the base, with appendiculate ascendent squamules. Germen (in male flower rudimentary) free, 1-locular; style (sometimes very short) stigmatiferous at apex, 3–5-fid, subdiscoidal or divided into 3–6 lobes, more or less thick, sometimes sessile; placentas parietal 3–5; ovules in each ∞. Berry subglobose; seeds ∞, subglobose, albuminous; testa coriaceous or crustaceous.—Small trees or shrubs; leaves alternate, dentate; stipules 0 or minute; flowers rather small, axillary, cymose; pedicels at apex 2-bracteolate (*New Zealand, Norfolk Island*[4]).

7 ? **Hymenanthera** R. Br.[5]—Flowers (nearly of *Melicytus*) polygamous; filaments of stamens short, connate in tube; connective (as in *Melicytus*) at apex and back appendiculate. Germen 1-locular; style short, apex stigmatiferous, 2-lobed, or very short subdiscoidal; placentas parietal 2, 1-ovulate. Berry subglobose, 1- or 2-spermous; seeds subglobose; embryo albuminous; cotyledons narrow.—Small

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Rep., i. 224; v. 60; *Ann.*, i. 71; ii. 67; iv. 235; vii. 218 (*Alsodeia*).

[1] *Fl. Per. et Chil.*, ii. 69, t. 22 (nec Ll. & Lex.).—DC., *Prodrom.*, viii. 669.—Endl., *Gen.*, n. 4231.—Benth., in *Hook. Journ.*, v. 215.—B. H., *Gen.*, 119, 970, n. 12.

[2] Spec. 3. Mart., *Nov. Gen. et Sp.*, ii. 85, t. 168, 169 (*Steudelia*).—Miq., in *Mart. Fl. Bras., Ebenac.*, 17, not.

[3] *Char. Gen.*, 123, t. 62.—J., *Gen.*, 428.—Gærtn., *Fruct.*, i. 206, t. 44, fig. 3.—Desrouss., in *Lamk. Dict.*, iv. 59.—Lamk., *Ill.*, t. 812.—DC., *Prodr.*, i. 257.—Endl., *Gen.*, n. 5081.—B. H., *Gen.*, 119, 970, n. 15.

[4] Spec. 4, Hook., *Lond. Journ.*, iii. t. 8 (*Elæodendron*).—Hook. f., *Fl. N.-Zel.*, i. 17, t. 8.—Walp., *Ann.*, vii. 220.

[5] *Congo*, 442; *Misc. Works* (ed. Benn.), i. 125; ii. 705.—Ging., in *Mém. Gen.*, ii. t. 2, fig. 9.—DC., *Prodr.*, i. 314.—Endl., *Gen.*, n. 5049; *Iconogr.*, t. 108; *Prodr. Fl. Norfolk.*, 70.—B. H., *Gen.*, 120, 970, n. 16.—*Solenantha* G. Don, *Gen. Syst.*, ii. 39.

trees or rigid bushes; branches sometimes spinescent at apex; leaves alternate or fasciculate, usually small, entire or denticulate; stipules minute or caducous; flowers axillary, solitary or in few-flowered cymes; pedicels short, 2- or few-bracteolate[1] (*Australia, New Zealand*[2]).

II. VIOLEÆ.

8. **Viola** T.—Flowers irregular; receptacle slightly convex. Sepals 5, subequal, base produced beyond insertion, imbricated. Petals unequal, dissimilar, imbricated; inferior usually larger, regular, above base calcarate or variously saccate. Stamens 5, alternipetalous; anthers equal, 2-locular, introrse longitudinally rimose; connective produced beyond cells in membrane; filaments short or very short, membranous; 2 anterior at base anteriorly calcarate. Germen free, 1-locular; placentas 3 (2 anterior, 1 posterior), ∞-ovulate; ovules anatropous; style above clavate and variously dilated, more or less recurved; dilatation inwardly stigmatiferous, and anterior side of varied form, open. Capsule elastic, longitudinally dehiscing. Valves 3, inwardly seminiferous at middle. Seeds ∞, ovoid or globose; testa crustaceous, usually nitid, at hilum minutely arillate; albumen fleshy; embryo straight, axil albuminous, subequal.—Herbs, sometimes suffrutescent; leaves alternate, base furnished with 2 stipules, often foliaceous wide persistent; flowers (often 2-morphous, fructiferous ones asepalous or cryptopetalous), axillary, usually solitary; peduncle 2–3-bracteolate (*Temp. regions of N. Hemisphere, Mount. S. America, N. Zealand, South Africa*). See p. 343.

9. **Hybanthus** JACQ.[3]—Flowers nearly of *Viola;* sepals not produced at base. Anterior petals larger than others, slightly above

[1] Nearly related to Gen. *Melycitus* (might be a section of it).

[2] Spec. 4. HOOK. F., *Fl. Tasman.*, i. 27; *Fl. N.-Zel.*, i. 17, t. 7.—BENTH., *Fl. Austral.*, i. 104.—*Bot. Mag.*, t. 3163.—WALP., *Rep.*, i. 225; ii. 767; *Ann.*, vii. 220.

[3] *Amer.*, 77, t. 175, figs. 24, 25 (1763).—NECK., *Elem.*, n. 1386 (1790).—DC., *Prodr.*, i. 311.—*Calceolaria* LŒFL., *It. Hisp.* (1758), 183 (nec FEUILL.).—*Pombalia* VANDELL., *Fasc.*, 7, t. 1 (1771).—DC., *Prodr.*, i. 306.—*Ionidium* VENT., *Jard. Malmais.*, t. 27 (1803).—DC., *Prodr.*, i. 307.—SPACH, *Suit. à Buffon*, v. 519.—ENDL., *Gen.*, n. 5041.—PAYER, *Fam. Nat.*, 108.—A. GRAY, *Gen. Ill.*, t. 82.—B. H., *Gen.*, 117, 970, n. 6.—*Solea* GING., in *DC. Prodr.*, i. 306.—A. GRAY, *op. cit.*, t. 81.—*Pigea* DC., *Prodr.*, i. 307.—*Vlamingia* DE VRIESE, in *Pl. Preiss.*, i. 398.

base gibbous or subsaccate. Stamens 5, free or more or less connate or coalescing; filaments short, or more or less elongated, sometimes linear; 2 anterior, or rarely 4, outwardly calcarate at base, gibbous or glanduliferous;[1] connective produced in membrane beyond cells. Germen of *Viola;* style recurved-clavate at apex, anteriorly stigmatiferous. Capsule sometimes crustaceous, elastically 3-valved; seeds ovoid-globose; testa crustaceous. Other characters of *Viola.*—Herbs, sometimes suffrutescent or erect shrubs; leaves alternate, sometimes opposite; stipules usually small; flowers axillary pedunculate, solitary or fasciculate, sometimes in terminal racemes (*All Tropical regions*[2]).

10? **Agation** An. Br.[3]—Flowers nearly of *Hybanthus;* sepals 5, subequal, not produced at base, deciduous. Petals unequal; anterior larger, labelliform, narrow at base and below gibbous-saccate. Stamens 5, free; filaments free, coalescing at margin; superior often finally free; 2 anterior outwardly below apex furnished with short recurved glands; anthers introrse, apex mucronulate; connective produced beyond cells in petaloid lamina. Germen free; placentas 3, ∞-ovulate; style thickened at apex recurved, anteriorly stigmatiferous. Capsule crustaceous-ligneous; valves 3 inwardly seminiferous at middle. Seeds ∞, compressed-winged, unequally 3, 4-angular,[4] imbricated; albumen often thin; embryo wide, radicle cylindrical; cotyledons flat, unequally sub-3-angular or obovate.—Sarmentose shrubs; leaves alternate, entire or dentate; stipules minute or caducous; flowers in compound racemes, axillary and terminal; pedicels articulate, 2-bracteolate[5] (*N. Caledonia, and Fiji Islands*[6]).

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[1] Glands sometimes coalescing in 1 entire or 2 lobes (in *Solea* and *Euhybanthus*).

[2] Spec. 40, of which 4 are African, 5 or 6 Australian, others of N. and S. America. Aubl., *Guian.*, t. 318 (*Viola*).— Forst., in *Trans. Linn. Soc.*, vi. 309, t. 28 (*Viola*).—H. B. K., *Nov. Gen. et Spec.*, v. 385, t. 494 (*Hybanthus*).—A. S. H., *Pl. Us. Bras.*, t. 9, 11, 20; *Pl. Rem.*, t. 27.—A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 87 (*Ionidium*); *Man.*, ed. 5, 76 (*Solea*).—Chapm., *Fl. S. Unit.-St.*, 34 (*Solea*).—C. Gay, *Fl. Chil.*, i. 227 (*Ionidium*).—*Miq.*, in *Linnæa*, xxii. 355.—Harv. & Sond., *Fl. Cap.*, i. 74 (*Ionidium*). — Benth., *Fl. Austral.*, i. 101 (*Ionidium*). — Oudem., *Viol*, 6 (*Ionidium*).—Tul., in *Ann. Sc. Nat.*, sér. 5, ix. 300.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 124 (*Ionidium*).—Turcz., in *Bull. Mosc.* (1863), i. 556 (*Ionidium*). — Thw., *Enum. Pl. Zeyl.*, 21 (*Ionidium*). — Oliv., *Fl. Trop. Afr.*, i. 105 (*Ionidium*).—Kl., in *Pet. Mossamb., Bot.*, 148 (*Ionidium*).—Griseb., *Fl. Brit. W.-Ind.*, 26; *Cat. Pl. Cub.* 11 (*Ionidium*).—Hook. f. & Thoms., *Fl. Brit. Ind.*, i. 185 (*Ionidium*).—Walp., *Rep.*, i. 221; ii. 767; v. 55; *Ann.*, i. 68; ii. 67; iv. 234; vii. 217 (*Ionidium*).

[3] In *Bull. Soc. Bot. de Fr.*, viii. 79; in *Ann. Sc. Nat.*, sér. 5, i. 346.—B. H., *Gen.*, 118, n. 7.—*Agatea* A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 89, t. 7.

[4] Testa, as affirmed, crustaceous on internal face, and there separating, "nigra et ad faciem internam membranacea."

[5] Gen. scarcely distinct from *Pombalia*, but differing by winged seeds.

[6] Spec. 2, 3. Walp., *Ann.*, vii. 218.

11. **Schweiggeria** Spreng.[1]—Flowers nearly of *Viola;* sepals 5; 3 exterior much larger, wide, hastate-cordate; 2 interior narrow, much smaller. Anterior petals larger than others, calcarate above base. Stamens and germen of *Viola;* style subclavate, apex expanded in 2 lobes, membranous, wing-shaped, anteriorly stigmatiferous between lobes. Capsule ovoid, 3-valved; seeds ovoid-globose; testa crustaceous. — Erect shrubs; leaves alternate; stipules minute; flowers axillary, solitary; peduncles articulate above bracts (*Trop. America*[2]).

12. **Anchietea** A. S. H.[3]—Flowers nearly of *Viola;* sepals subequal, base not produced. Anterior petal larger than others, long calcarate. Stamens and germen of *Viola;* style subclavate, anteriorly stigmatiferous at apex. Capsule very large, membranous-vesiculate, inflated, 3-valved; seeds plano-compressed; testa membranous, margin expanded in wide orbicular wings. — Scandent shrubs; leaves alternate; stipules small; flowers in short axillary racemes (*Brazil*[4]).

13. **Noisettia** H. B. K.[5]—Flowers nearly of *Viola;* sepals subequal, base not produced. Anterior petal larger than others, long calcarate. Stamens and germen of *Viola;* style clavate, incurved, anteriorly stigmatiferous at apex. Capsule ovoid, elastically 3-valved; seeds ovoido-globose; testa crustaceous. — Subsimple erect undershrubs; leaves alternate; stipules 2, lateral; flowers axillary, shortly racemose; pedicels articulate above middle (*Trop. America and N. Subtrop.*[6]).

14. **Corynostylis** Mart.[7]—Flowers nearly of *Viola;* sepals minute, subequal, base not produced. Anterior petal larger than others,

[1] *Neue Entd.*, ii. 167.—DC., *Prodr.*, i. 290. —Endl., *Gen.*, n. 5044.—B. H., *Gen.*, 117, n. 4.—*Glossarrhen* Mart. & Zucc., *Nov. Gen. et Spec.*, i. 21, t. 15.—DC., *Prodr.*, i. 290.

[2] Spec. 2. A. S. H., *Pl. Rem. Brés.*, t. 26 B. —Mart., in *Nov. Act. Nat. Cur.*, xii. t. 8 (*Glossarrhen*). — *Bot. Reg.* (1841), t. 40.—Walp., *Rep.*, i. 223.

[3] *Pl. Us. Bras.*, t. 19; *Pl. Rem. Brés.*, 290. —Endl., *Gen.*, n. 5043.—B. H., *Gen.*, 117, n. 3.—H. Bn., in *Dict. Encyl.*, iv. 290.

[4] Spec. 2, 3. ? H. B. K., *Nov. Gen. et Spec.*, i. 23, t. 499, 499 *b*, fig. 1 (*Noisettia*).—? A. S. H., *Pl. Rem. Brés.*, i. 26 (*Noisettia*).—A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 88. — Walp., *Rep.*, i. 223.

[5] *Nov. Gen. et Spec.*, v. 382, t. 499 *b*, fig. 2 (nec Mart.).—DC., *Prodr.*, i. 290. — Endl., *Gen.*, n. 5042.—B. H., *Gen.*, 117, n. 2.—*Bigelowia* DC., mss. (ex Endl.).—*Violæoides* Michx., mss. (ex Endl.).—? *Ionidiopsi*, Presl., *Bot. Bem.*, 13.—Walp., *Ann.*, i. 69.

[6] Spec. 2 v. 3. Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 123.—Walp., *Rep.*, i. 223.

[7] *Nov. Gen. et Spec.*, i. 25, t. 17, 18.—Endl., *Gen.*, n. 5045. — B. H., *Gen.*, 116, n. 1.—*Calyptrion* Ging., in *Mém. Gen.*, ii. t. 2, fig. 1; in *DC. Prodr.*, i. 288.

produced above base into a very large spur; limb small. Other petals smaller; anterior connivent, lateral rather erect. Stamens 5; filaments very short, subperigynously inserted; 2–4 inferior, shortly villose-calcarate at back. Anthers introrse, flat adnate, and germen nearly of *Viola*, globose-3-gonal. Ovules very numerous; style clavate, anteriorly at apex stigmatiferous. Capsule coriaceous, large, ovate, sub-3-agonal, ligneous, corticate; valves 3, not elastic, seminiferous at middle; seeds suborbiculate, plano-compressed; testa crustaceous, rugose, not winged; albumen thin.—Scandent shrubs; leaves alternate, petiolate, ovate, often sharply serrate or serrulate, glaberrimous, nitid; stipules deciduous; flowers[1] in terminal racemes; inferior solitary, in axils of upper leaves; pedicels elongated at middle, 2-bracteolate, and above bractlets articulate (*Trop. America*[2]).

III. SAUVAGESIEÆ.

15. **Sauvagesia** L.—Flowers regular hermaphrodite; receptacle convex. Sepals 5, subequal, imbricated, finally very patent, fructiferous closed. Petals same in number, alternate, convolute, patent at anthesis, deciduous. Stamens 5, fertile, alternipetalous, hypogynous; filaments free; anthers linear, 2-locular, extrorsely or sublaterally rimose. Laminæ petaloid 5 (staminodes?), alternating with fertile stamens, and exterior to them, convolute, surrounded by filaments, externally glanduliferous at apex (linear staminodes?), 5–10, oftener ∞, in alternipetalous bundles. Germen free, 1-locular; ovules ∞, anatropous, ascendent, inserted on three parallel placentas; style simple, apex stigmatiferous, obtusely or scarcely dilated. Capsule attended by persistent calyx and androceum, septicidal, 3-valved. Seeds ∞, small; testa crustaceous, usually scrobiculate; albumen fleshy; embryo axile; radicle rather terete, longer than cotyledons.—Glabrous herbs or undershrubs; leaves alternate, rather rigid, entire or serrulate, shortly petiolate or sometimes sessile; stipules pectinate-ciliate; flowers axillary or in terminal racemes, bracteate (*Trop. America, all trop. regions*). See p. 346.

[1] Handsome.

[2] Spec. 1, 2. Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xvii. 124.—Walp., *Rep.*, i. 223.

16? **Schuurmansia** Bl.[1]—Flowers nearly of *Sauvagesia;* sepals 5, equal or slightly unequal, præfloration much imbricated. Petals subequal, convolute. Staminodes 5, linear or subulate, subconformed to filaments of disk ∞, exterior smaller and slighter. Filaments of fertile stamens 5, short, free, erect; anthers oblong-linear, dehiscing at apex of pores or subintrorsely or laterally by longitudinal clefts. Capsule nearly of *Sauvagesia*, septicidal 3-valved. Seeds ∞; testa membranous, dilated in orbicular wings; embryo axile, albuminous, cotyledons very short; radicle terete.—Glabrous trees or shrubs; leaves alternate or approximate at summit of twigs, entire or serrulate; stipules small; flowers in compound terminal racemes (*Indian Archipelago*[2]).

17? **Neckia** Korth.[3]—Flowers nearly of *Sauvagesia;* sepals subequal, imbricated. Petals 5, equal; præfloration convolute. Stamens 3-morphous; exterior ∞, small, setaceous or glanduliform at apex; interior to 10, clavate, base connate in tube with fertile stamens; filaments very short, inserted at summit of tube between staminodes. Germen nearly of *Sauvagesia;* placentas parietal 3, ∞-ovulate; style simple, erect, apex stigmatiferous. Capsule at apex septicidally, 3-valved. Seeds ∞, not winged.—Glabrous shrubs and undershrubs; leaves alternate, serrulate; stipules subulate, rigid; flowers axillary, long-pedunculate (*Indian Archipelago*[4]).

18. **Lavradia** Vell.[5]—Flowers nearly of *Sauvagesia;* sepals subequal or unequal; præfloration much imbricated. Petals 5, equal, convolute. Stamens 5, fertile, alternipetalous; staminodes[6] outwardly connate in conical entire or 5–10-dentate tube, including sexual organs. Anthers subsessile, ovate or oblong-linear; cells 2, subintrorse or laterally rimose. Germen from base to apex 1-locular, or at base 3-locular; placentas parietal 3; ovules on each ∞, oblique; style simple, apex stigmatiferous, obtuse. Fruit capsular,

[1] *Mus. Lugd.-Bat.*, i. 177, t. 32.—B. H., *Gen.*, 120, n. 20.

[2] Spec. 2. Hook. f., in *Trans. Linn. Soc.*, xxiii. 157.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 117.—Walp., *Ann.*, ii. 68; vii. 220.

[3] In *Ned. Kruidk. Arch.*, i. 358.—B. H., *Gen.*, 120, n. 21.

[4] Spec. 2, 3. Hook. f., in *Trans. Linn. Soc.*, xxiii. 158.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 118; *Fl. Sum.*, 159.—Walp., *Ann.*, ii. 67; vii. 221.

[5] Ex Vandell., in *Rœm. Script.*, 88, t. 6, fig. 6.—A. S. H., *in Mém. Mus.*, xi. 107, t. 7–10; *Pl. Rem. Bras.*, 69, t. 4, fig. 6, t. 5–8; *Fl. Bras. Mer.*, ii. 111.—DC., *Prodr.*, i. 314.—Endl., *Gen.*, n. 5051.—Payer, *Fam. Nat.*, 91.—B. H., *Gen.*, 120, n. 19.

[6] Disk petaloid gamophyllus, ex Payer, *loc. cit.*

surrounded at base by persistent calyx, more or less distant from apex septicidally 3-valved; seeds ∞, small, albuminous; embryo axile, straight. Other characters of *Sauvagesia*.—Glabrous undershrubs; leaves alternate, crowded, rather rigid entire or subserrate shortly petiolate; stipules entire or oftener pectinate-ciliate, persistent; flowers in terminal, simple or compound racemes, sometimes axillary, bracteate (*Brazil*[1]).

Spec. 6. A. S. H., in *Mém. Mus.*, ix. 325.—Mart. & Zucc., *Nov. Gen. et Spec.*, i. 31, t. 22, 23. —Walp., *Rep*, i. 226.

XXXIV. OCHNACEÆ.

I. OURATEA SERIES.

Ochna, from which this small family has received its name, is not the simple type of it; but it is met with in most of the species of *Ouratea*[1] (figs. 378–380), which have regular hermaphrodite penta-

Ouratea decora.

Fig. 378.
Flower and bud.

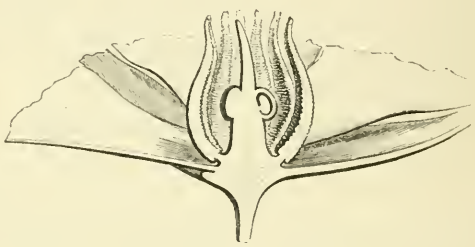

Fig. 380.
Long. sect. of flower ($\frac{3}{1}$).

merous flowers, with diplostemonous androceum. On their convex receptacle are generally inserted five quincuncially imbricated sepals and five alternate subsessile petals,[2] contorted in præfloration. The stamens are attached above the perianth, superposed, five to the sepals and five to the petals, each formed on a very short or subnil free filament and basifixed elongated erect anther, with two lateral or slightly introrse lobes, their wall quite covered with transverse unequal wrinkles, and each dehiscing at the summit by a kind of pore by which the pollen escapes.[3] After bearing the androceum

[1] Aubl., *Guian.*, i. 397, t. 152 (1775).—H. Bn., in *Adansonia*, x. fasc. 12.—*Jabotapita* Plum., *Gen.*, 41, 32 (1703). — *Sophisteques* Commers., mss., ex J., *Gen.*, 282 (1789).—*Gomphia* Schreb., *Gen.*, i. 291 (1789).—DC., *Prodr.*, i. 736; in *Ann. Mus.*, xvii. 414, t. 6–10.—Turp., in *Dict. Sc. Nat.*, Atl., t. 121.—Endl., *Gen.*, n. 5958.—Schnizl., *Iconogr.*, t. 248.—B. H., *Gen.*, 318, 993, n. 2.—*Cittorhynchus* W., mss. (ex Endl.).—*Correia* Velloz., in *Rœm. Script.*, 106, t. 6 (ex Endl.). — *Philomeda* Noronh. (ex Dup.-Th., *Gen. Nov. Madag.*, 17).

[2] Yellow, sometimes very odoriferous.

[3] Ovoid; three folds; in water ovoid, three bands with papillæ. "*Ochna atropurpurea*, *Gomphia fimbriata* Boj." (H. Mohl., in *Ann. Sc. Nat.*, sér. 2, iii. 339).

the receptacle elongates more or less into a column or gynophore, the five alternipetalous carpels being arranged in a verticil on the summit. Each carpel is composed of a unilocular ovary, surmounted by a style more or less gynobasic[1] uniting with the neighbouring styles, so as to form with them a conical tube,[2] stigmatiferous at apex, simple or scarcely denticulate. In the internal angle, towards the base, is inserted an ascending anatropous ovule, with micropyle looking downwards and outwards.[3] After fertilization the ovaries become independent drupes, grouped towards the summit of the thickened, often fleshy, coloured,[4] receptacle, accompanied at the base by the persistent calyx. In each not very thick stone[5] is seen an ascending seed, the coats covering a fleshy exalbuminous embryo, with plano-convex cotyledons[6] and short inferior radicle.[7] There are some hundred species[8] of *Ouratea;* they inhabit all tropical regions, but are especially numerous in America. They are glabrous trees or shrubs, with alternate persistent simple leaves, often coriaceous, generally finely cut on the edges like the teeth of a saw, with numerous secondary parallel nerves. They are accompanied by two free or connate axillary stipules. The flowers are united in terminal or axillary racemes generally ramified, more rarely simple or umbelliferous,

Ouratea decora.

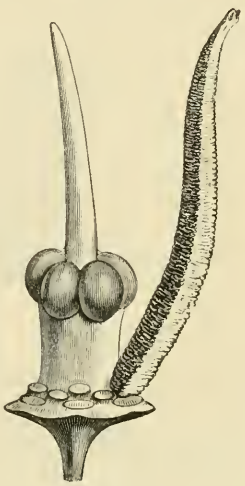

Fig. 379.
Gynæceum and stamen ($\frac{1}{1}$).

[1] In reality each style is detached from the internal angle of the ovary more or less near the base, creeping from without inwardly, and from below upwards upon the receptacle, against which it is closely applied and proceeding to join the other styles, with which it unites by the edges to form a common tube from the summit of the receptacle. The same arrangement is pretty clearly seen in several *Ochnas.*

[2] This tube is often traversed by spiral flutings corresponding to the edges, by which the five styles unite.

[3] With double coat.

[4] Generally dark purple; the pericarps become nearly black at maturity.

[5] It is often of the consistence of parchment. The mesocarp is sometimes quite membranous.

[6] In some species they are pink, lighter or darker upon the edges.

[7] Sometimes longer than the cotyledons, conical at the summit; sometimes, on the contrary, truncate, and shorter than the cotyledons.

[8] H. B., *Pl. Æquin.*, ii. 21, t. 74.—H. B. K., *Nov. Gen. et Spec.*, vi. 13 (*Gomphia*).—A. S. H., *Pl. Rem. du Brés.*, 90, t. 9; *Pl. Us.*, t. 38; *Fl. Bras. Mer.*, i. 60, t. 12, 13 (*Gomphia*).—Pohl., *Pl. Bras.*, t. 178–185 (*Gomphia*).—Velloz., *Fl. Flum.*, v. t. 89–94 (*Ochna*).—Hook., *Icon.*, t. 712 (*Gomphia*).—Pal. Beauv., *Fl. Ow. et Ben.*, t. 71, 72 (*Gomphia*).—Oliv., *Fl. Trop. Afr.*, i. 319 (*Gomphia*).—H. Bn., in *Adansonia*, ix. 75 (*Gomphia*).—Tr. & Pl., in *Ann. Soc. Nat.*, sér. 4, xviii. 273 (*Gomphia*).—*Bot. Mag.*, t. 5262.—Walp., *Rep.*, i. 526; v. 399; *Ann.*, i. 181; ii. 260; iv. 421; vii. 543 (*Gomphia*).

provided with bracts, the divisions bearing small groups of flowers, frequently cymes with articulate pedicels.

Ochna leucophlæos.

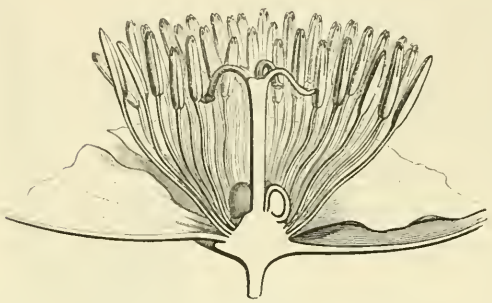

FIG. 381.
Longitudinal section of flower.

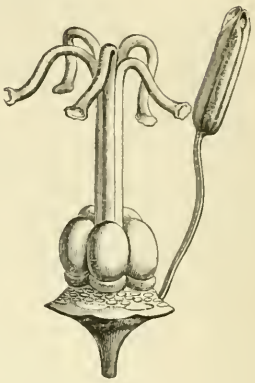

FIG. 382.
Gynæceum and stamen ($\frac{6}{1}$).

In several species of *Ouratea*, the flowers are here and there tetramerous and the carpels four to six in number. In others the ovule is surmounted at the chalaza by an arillate dilatation taking

Ochna mozambicensis.

FIG. 383.
Fruit.

FIG. 384.
Longitudinal section of fruit.

the form of a hook.[1] This fact is especially noticeable in certain Asiatic and particularly in Oceanian species, having axillary fasciculate flowers, and of which the genus *Brackenridgea* has been made.[2]

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[1] We have already stated this fact in certain African species, as *O. Duparquetiana* (*Gomphia Duparquetiana* H. BN., in *Adansonia*, ix. 77).

[2] A. GRAY, *Unit.-St. Expl. Exp., Bot.*, i. 361, t. 42.—B. H., *Gen.*, 318, 993, n. 3.—F. MUELL., *Fragm. Phyt. Austral.*, v. 29.—WALP., *Ann.*, iv. 421.

In *O. Theophrasta*,[1] also distinguished generically under the name *Wolkensteinia*;[2] the flower presents outside the five petals eight or ten coloured sepals[3] instead of five.

Beside *Ouratea* is found *Elvasia*, which instead of totally independent carpels has them united below into a 2–5-lobed ovary and an androceum formed of four, five, or an indefinite number of stamens; *Tetramerista*, which has tetramerous, tetrandrous flowers with four-lobed ovary; and *Ochna* (figs. 381–384), whose name this family bears, but which may be considered as a type derived from *Ouratea*, having flowers with an indefinite number of stamens, a gynæceum and fruit formed of independent carpels, like those of *Ouratea*, from three to fifteen in number.

II. EUTHEMIS SERIES.

The flowers of *Euthemis*[4] (fig. 385) are externally similar to those of *Ouratea* and *Ochna*, with five unequal, ciliate, imbricated sepals, more or less persistent, and five alternate, imbricated or contorted petals. The androceum is composed of five fertile, alternipetalous stamens, formed of a very short filament and two-celled rostrate anther, dehiscing at the summit by a pore; and five sterile stamens, alternating with the preceding, which may be partly wanting. The gynæceum is inserted upon the apex of the receptacle slightly prolonged into a cone; it is composed of an ovary with five alternipetalous incomplete cells, tapering above into a subulate style, stigmatiferous, simple or scarcely dilated at the apex. Towards the internal angle of each cell are two descendent, anatropous ovules, with micropyle directed upwards and outwards. The fruit is a small

Euthemis leucocarpa.

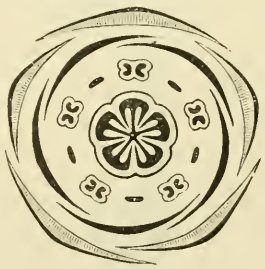

Fig. 385.
Diagram.

[1] Lind. ex Hook. f., in *Bot. Mag.*, t. 5612. —Hér., in *Hortic. Franc.*, xxi. 15, t. 1.

[2] There are five more interior quincuncially arranged, exactly alternating with the petals; then outside these three others similarly imbricated, two of them posterior. The petals are contorted, and the five shortest stamens superposed to them are inserted a little lower and outside the five others.

[3] Regel, in *Gartenfl.*, xiv. (1865), 131, t. 471.

[4] Jack, *Mal. Misc.*, in *Hook. Bot. Misc.*, ii. 69.—Wall., in *Roxb. Fl. Ind.*, ii. 303.—Endl., *Gen.*, n. 5961. — B. H., *Gen.* 319, n. 6.

drupe with pulpy sarcocarp enveloping five fibrous stones, in each of which are one or two descendent seeds. These contain under their coats a fleshy albumen, and an axile, slender, cylindrical embryo, with elongated superior radicle. *Euthemis* consists of shrubs from Malayasia; four species[1] have already been described; their habit is analogous to that of *Luxemburgia*, *Sauvagesia*, &c. The alternate petiolate leaves are simple, coriaceous, smooth, cut upon the edges in small teeth like a saw, as are those of *Ochna*, with numerous secondary and parallel nerves. The flowers[2] are arranged in terminal leaf-opposed racemes, solitary or geminate in the axil of each bract of the inflorescence, and accompanied by one or several sterile bractlets.

III. LUXEMBURGIA SERIES.

Luxemburgia[3] (figs. 386–390) has hermaphrodite irregular flowers with convex receptacle. The calyx is formed of five unequal sepals,

Luxemburgia polyandra.

Fig. 386.
Bud ($\frac{3}{1}$).

Fig. 387.
Flower ($\frac{2}{1}$).

Fig. 388.
Long. sect. of flower.

often ciliate upon the edges caducous, and arranged in quincuncial præfloration,[4] and the corolla of five alternate subequal petals im-

[1] Hook., *Icon.*, t. 711.—Hook. f., in *Trans. Linn. Soc.*, xxiii. 163.—Walp., *Rep.*, i. 528; v. 60, 400; *Ann.*, i. 179; vii. 544.

[2] White or pink.

[3] A. S. H., in *Mém. Mus.*, ix. 351.—DC., *Prodr.*, i. 350.—B. H., *Gen.*, 319, n. 7.—Pl., in *Voy. Lind.*, 62.—*Plectranthera* Mart., *Nov. Gen. et Spec.*, i. 39, t. 36.

[4] There are two exterior generally smaller; and the three interior, often more developed than the others, are besides contorted in the bud.

bricated[1] or contorted in the bud. The stamens are indefinite in number, sometimes pretty considerable, often also only from ten to eight. Their filaments are short, united into a sort of thick tube, widely cleft on the anterior side of the flower, so that the androceum only surrounds the gynæceum behind. The anthers are elongate-linear, basifixed, two-celled, divided into four secondary cells separated by longitudinal grooves; they open almost at the summit by two pores or short clefts. The gynæceum is composed of a superior ovary slightly excentric, tapering at the summit into a subulate style with simple stigmatiferous apex. In the ovary are seen two, three, or five parietal placentas, more or less prominent in the interior of the cavity, and bearing on their reflexed edges[2] a number of anatropous, imbricated, ascending ovules. The fruit is a septicidal capsule, divided at maturity into three or five valves, often leaving upon the receptacle, from which they detach themselves, woody bands corresponding to their edges. The seeds are small, numerous, attached within towards the edge of the valves. Their outer coat is more or less dilated in the form of a wing; and their inconsiderable, fleshy albumen surrounds a cylindrical embryo.

Luxemburgia polyandra.

Fig. 389. Dehiscent fruit.

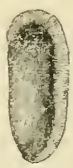

Fig. 390. Seed ($\frac{5}{1}$).

Luxemburgia, of which half a dozen species[3] are known, consists of trees and elegant shrubs, ramose and glabrous, natives of Brazil. Their cylindrical branches are loaded with alternate simple, petiolate, coriaceous, smooth serrulate leaves, often ciliate upon the edges and summit, penninerved, with parallel secondary nerves, fine, close, generally subperpendicular to the midrib, with two lateral ciliate stipules. The flowers[4] are disposed in simple terminal racemes, each supported by an articulate pedicel at the base, accompanied by two lateral bractlets.

Beside this genus are placed several others, which all belong to the

[1] There is often one large one enveloping all the others, then three often smaller than the preceding, covered on one edge, and covering by the other; finally, a fifth, quite interior, and enveloped on both edges.

[2] Their transverse section often has the form of an arrow head.

[3] A. S. H., *Pl. Rem. Brés.*, 331, t. 29, 30; *Fl. Bras. Mer.*, ii. 113.—Walp., *Rep.*, i. 226; *Ann.*, i. 175.

[4] Yellow, elegant, sometimes odoriferous.

warm regions of South America, and are only distinguished by inconsiderable characters. They are: *Godoya*, with sepals accompanied by axillary tongues, stamens ten or indefinite in number, ramified inflorescences, and simple or pinnate leaves; *Cespedesia*, with sepals naked within, the other characters being nearly those of *Godoya*; *Blastemanthus*, which has flowers arranged in racemes, with a calyx accompanied without by imbricated bracts analogous to sepals, and round ten fertile stamens a variable number of subulate staminodes; *Pœcilandra*, which has five fertile stamens, polymorphous staminodes, and ramified inflorescences; finally, *Wallacea*, with flowers nearly like those of *Pœcilandra* as to the five fertile stamens and exterior staminodes, but solitary or geminate in the axils of the entire leaves.

De Candolle,[1] in 1811, considered this small family distinct. Before him de Jussieu[2] placed *Ochna* among the group allied to *Magnoliaceæ* and *Ouratea* among the *Gen. incertæ sedis*. The family, adopted by most botanists,[3] was only represented at first by the genera of the *Ouratеæ* and *Gomphiæ* series, to which Miquel[4] added the genus *Tetramerista*. In 1846, Planchon[5] extended the limits of the group by adding the two tribes *Euthemidieæ* and *Luxembergieæ*;[6] the former only being then represented by the genus *Euthemis*, the latter by the four genera *Luxembergia*, *Godoya*, *Cespedesia*, and *Blastemanthus*. Bentham and Hooker,[7] adopting the same limits for the *Ochnaceæ* family, have added to its last tribe the new genus *Wallacea* of Spruce, and *Pœcilandra*,[8] before connected with *Ternstrœmiaceæ*. In introducing, as we have done, *Brackenridgea* in the genus *Ouratea*, the number of types generically preserved is eleven, including about a hundred and thirty species. The distinctive characters of the three series are the following:—

I. Ouratеæ.—Gynæceum with carpels independent in the ovary, or ovary 2–15-celled, with one ovule in each cell, subtransverse or

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[1] In *Ann. Mus.*, xvii. 398; *Prodr.*, i. (1824), 735.

[2] *Gen.* (1789), 232.

[3] A. S. H., in *Mém. Mus.*, x. 129.—Lindl., *Introd.*, ed. 2, 129; *Veg. Kingd.* (1846), 474, Ord. 178.

[4] *Fl. Ind.-Bat.*, Suppl. (1860).

[5] In *Hook. Lond. Journ.*, v. 584.

[6] He excluded *Walkera* (Schreb., *Gen.*, 578) or *Mœsia* (Gærtn., *Fruct.*, i. 344, t. 70), of which Benth. & Hook. say: "Gen. fid. Planchonii falsum est, ex icone floris erron. *Horti malab.* et fructu imperfecto anal. falsa Gærtneri fictum. Cf. *Hook. Lond. Journ.*, v. 593."

[7] *Gen.*, 316, Ord. 41.

[8] Tul., in *Ann. Sciences Nat.*, sér. 3, viii. (1817).

ascendent, with inferior exterior micropyle. Styles often gynobasic, united above into a single column. Fruit drupaceous or dry, indehiscent. Seeds exalbuminous.—(4 genera.)

II. Euthemideæ.—Gynæceum with carpels united among themselves, with two ovules in each cell; micropyle superior and exterior. Fruit drupaceous, with five stones. Seeds albuminous.—(1 genus.)

III. Luxemburgiæ.—Gynæceum generally eccentric, with parietal placentas (2–5), more or less prominent, multiovulate upon the edges. Fruit capsular, septicidal, polyspermous. Seeds albuminous.—(6 genera.)

All the species of this last series, fifteen or sixteen in number, are natives of the tropical regions of South America. The *Euthemideæ*, three or four in number, belong entirely to Malaysia. The only known *Tetramerista* is from Sumatra. The genus *Elvasia* is entirely American. All the *Ochnas* belong, on the contrary, to the tropical or subtropical regions of the Old World. The genus *Ouratea* has the most extended geographical area. It is represented in tropical America by about two-thirds of its species, that is to say, some fifty; but it is met with in Asia and Africa, and in Oceania is found that particular form constituting the subgenus *Brackenridgea*.

The only common characters of all the members of this small family are the woody consistence of the stem, the alternation of the leaves, the presence of stipules, the convexity of the floral receptacle, the independence of the petals, and the absence of the glandular disk. But there are other characters very frequent, without being absolute. These are principally: the simple nature of the leaves,[1] their mode of nervation, the secondary nerves being crowded, parallel, oblique or nearly perpendicular to the principal nerve, and the fine, regular marginal cuts, like the teeth of a saw, sometimes glandular,[2] the prolongation of the receptacle into a column of variable height between the insertion of the androceum and gynæceum. The other characters are subject to variations; those drawn from the organization of the gynæceum and fruit have been used, as we have seen, to distinguish the series or tribes; the others to separate the genera.

[1] Pinnate in the only *Godoya* (*Rutidanthera*) *splendida* Pl. (in *Hook. Lond. Journ.*, v. 599, t. 19, 20), of New Grenada (vulg. *Quiebrahacha*).

[2] With punctuate edges in *Pœcilandra* and *Blastemanthus*; a character found in some analogous types of the allied family *Rutaceæ*.

It cannot be denied that the organization of the *Ochnaceæ* give them the greatest analogy with *Rutaceæ*, of which they might possibly be considered a tribe. It is true they have not glandular punctuations, they do not contain odoriferous essential oil, they have stipules, the flowers are destitute of glandular disk, and in their fruit the endocarp, when it is capsular, does not separate from the exocarp; but these are characters which may possibly be wanting in the *Rutaceæ*, and which have not much value in themselves. The functional organization of the gynæceum in the *Ochnaceæ* is, moreover, much more similar to that of the *Rutaceæ* than is generally supposed. Certain *Hypericaceæ* have apparent analogies with the *Ochnaceæ*; but their leaves are opposite and odoriferous. Perhaps the *Dilleniaceæ* of those genera with yellow imbricated petals, independent carpels, and fleshy fruit, are more closely allied to the *Ochnaceæ* than they are said to be. *Crossosoma* seems also to nearly approach the *Ochnaceæ* with independent carpels, and certain *Simarubeæ*. But where this great analogy presents itself, the *Dilleniaceæ* have different leaves from those of the *Ochnaceæ*, arillate seeds, and a small embryo situated towards the summit of an abundant fleshy albumen.

We have seen how[1] *Ternstræmiaceæ*, to which the genus *Pæcilandra* has been attributed, is distinguished from *Ochnaceæ*, only by unimportant characters it is true. The same may be said of those separating *Ochnaceæ* from certain *Violaceæ*, such as the *Sauvagesiæ*. It is not without strong reasons that these latter have been classed by some authors[2] in the same group with *Luxemburgiæ*, and perhaps they are as well placed there as among the *Ochnaceæ*. The *Luxemburgiæ* are always distinguished from the *Sauvagesiæ* by "their simple anthers dehiscing by two short pores,[3] not connivent round the gynæceum, and by the very different character of the staminal filaments." It may be admitted to a certain point, in consequence of what has been said, and by the comparing of the vegetative organs, the leaves, &c., of certain species of *Rinorea* with *Ochnæ*, that these latter represent a regular form, with independent carpels, of the arborescent *Violaceæ*. The woody *Cistaceæ*, so nearly allied to *Violaceæ*, have, for the same reason, some affinity with the *Ochnaceæ*.

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[1] See p. 256.

[2] See Lindl., *Veg. Kingd.*, 343.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xviii. 275.

[3] Except *Wallacea* (B. H., *Gen.*, 316).

The small number of useful species[1] that are found in this group, are remarkable for their bitter qualities, recalling those of Quassia. In Brazil, *Ouratea Jabotapita*[2] and *hexasperma*[3] are used in all cases where bitter drugs are considered useful. The bark of the latter, which probably acts in this case as an astringent, is used in treating wounds of cattle caused by stings of insects. At Malabar, the root and leaves of *O. angustifolia*[4] are prescribed as bitter, stomachic, digestive, and as preventing sickness. A decoction is administered in milk or water. In the Antilles, the same properties are ascribed to *O. ilicifolia*.[5] The seeds of *O. parviflora*[6] give an oil used in Brazil as a condiment. The wood of some beautiful trees of the *Luxemburgiæ* group is usefully employed in Columbia, and the habit, foliage, and the beauty of their flowers make them valued in our greenhouses. We may especially mention: *Cespedesia Bonplandi*[7] and *macrophylla*,[8] *Godoya splendida*[9] and *antioquiensis*.[10] *Gomphia Theophrasta*[11] is also beautiful and ornamental; *O. mozambicensis* (figs. 383, 384), *atropurpurea*, and some Ourateas, with abundant brilliant yellow flowers, are also cultivated.

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[1] Endl., *Enchirid.*, 606. — Lindl., *Veg. Kingd.*, 474.—Rosenth., *Syn. Pl. Diaphor.*, 869, 1156.

[2] *Gomphia Jabotapita* Sw., *Fl. Ind. Occ.*, ii. 740 (nec Velloz.).—DC., in *Ann. Mus.*, xvii. 418.—*Ochna Jabotapita* L. (part.).

[3] A. S. H., *Pl. Us. Bras.*, n. 38, ic.

[4] *Gomphia angustifolia* Vahl., *Symb. Bot.*, ii. 49.

[5] DC., *loc. cit.*, n. 10; *Prodr.*, i. 736, n. 11.

[6] DC., in *Ann. Mus.*, xvii. 420, t. 16. — *O. Jabotapita* Velloz., *Fl. Flum.*, v. t. 90 (nec Plum.).

[7] Goud., in *Ann. Sc. Nat.*, sér. 3, ii. 319.—*Marcgravia* H. B. K., *Nov. Gen. et Spec.*, vii. 277 (*Lingua de vacca*, of New Grenada).

[8] Seem., *Voy. Her., Bot.*, 97.

[9] See p. 371, note 1.

[10] Pl., in *Hook. Lond. Journ.*, v. 597, ic. (*Caunce*, in N. Grenada). At the Cape, the wood of *Ochna arborea* Burch, is used for domestic purposes.

[11] See p. 367, note 1.

GENERA.

I. OURATEÆ.

1. **Ouratea** Aubl.—Flowers hermaphrodite; receptacle convex. Sepals 5, or more rarely 7, 8, very often coloured, imbricated, persistent or deciduous. Petals 5, slightly longer than calyx, obovate, shortly unguiculate, imbricated or contorted, usually deciduous. Stamens 10, inserted with perianth, 2-seriate; filaments free, very short; anthers elongated, outwardly rugose, 2-locular, poricidal at apex. Carpels 5 (or more rarely 6–8), alternipetalous, inserted at summit of receptacle, produced in cylinder beyond insertion of androceum. Germen free, 1-locular; style more or less gynobasic, afterwards strictly coalescing in long conical tube, at apex stigmatiferous, not thickened, free at a greater or less height, or not distinct; ovules in each germen solitary, ascending, subbasilar; micropyle extrorse, inferior. Drupes 5, or fewer by abortion, inserted on variously enlarged coloured receptacle. Seed suberect; testa membranous; embryo exalbuminous; cotyledons planoconvex, fleshy; radicle short, inferior.—Glabrous trees or shrubs; leaves alternate, persistent, simple, coriaceous, nitid, sharply serrate; nerves crowded, parallel; stipules 2, usually slightly super-axillary, free or connate; flowers in terminal or axillary racemes, sometimes subumbellate, compound cymiferous; pedicels bracteolate, articulate at base (*All Trop. and Subtrop. regions*). See p. 365.

2. **Elvasia** DC.[1]—Flowers 3–6, or oftener 4, 5-merous; receptacle depressed conical. Sepals petaloid and petals same in number, alternate (of *Ouratea* or *Ochna*). Stamens hypogynous, 6–10, or ∞; filaments inserted slightly above perianth, persistent; anthers elongated (*Euelvasia*[2]) or short (*Hostmannia*[3]), poricidal at apex. Germen placed at summit of slightly stipitiform receptacle, outwardly sulcate; cells 2 (*Hostmannia*), or 4, 5 (*Euelvasia*), alternipetalous; style

[1] In *Ann. Mus.*, xvii. 422, t. 20; *Prodr.*, i. 738.—A. S. H., *Fl. Bras. Mer.*, i. 69, not.—A. Juss., *Mém. Rutac.*, 60, not.—Endl., *Gen.*, n. 5957.—B. H., *Gen.*, 318, n. 4.

[2] Pl., in *Hook. Lond. Journ.*, v. 648.

[3] Pl., in *Hook. Icon.*, t. 709.

long subulate, at apex stigmatiferous, capitate or 4, 5-denticulate; ovules in each cell 1, or more rarely 2, ascending or subhorizontal;[1] micropyle extrorse, inferior. Fruit 2–5-lobed; lobes radiating or subcupular; lobes depresso-radians, obtuse at apex; coriaceous, indehiscent; fertile cells 1–3, 1-spermous; seed thick, depressed, subhorizontal; cotyledons thick.—Glabrous trees; branches terete; leaves alternate, oblong-lanceolate, entire; nerves crowded, parallel; stipules 2, setaceous; flowers[2] in compound much ramified terminal racemes, bracteate at base; pedicels articulate, bracteolate at base (*South Eastern Trop. America*[3]).

3. **Tetramerista** Miq.[4]—Sepals 4, decussate imbricated, of which 2 interior are smaller lateral, persistent. Petals 4, of which 2 are anterior, widely inserted at base, decussate imbricated, persistent. Stamens 4, alternipetalous; filaments free, flattened at base; anthers oblong-sagittate, introrsely 2-rimose. Germen inserted at summit of receptacle, 4-lobed; style subulate, simple stigmatiferous at apex; ovules in each cell 1, or 2 (?), ascending. "Berry[5] globose, coriaceous, with evanescent septa 1-locular, 4-spermous; seeds oblong."—A tree?; leaves alternate, exstipulate, simple, oblong-lanceolate, entire, coriaceous, glabrous; flowers in axillary racemes, naked at base; bracts foliaceous; bractlets 2, lateral, analogous to sepals, narrowly decurrent on both sides of pedicels (*Sumatra*[6]).

4. **Ochna** Schreb.[7]—Flowers nearly of *Ouratea;* petals 5–10. Stamens ∞. Carpels 3–15; styles same in number, stigmatiferous at apex, free for a greater or less distance; ovules, drupes, large fructiferous receptacle, and seeds of *Ouratea.*—Glabrous trees or shrubs; leaves alternate, deciduous, entire, or much oftener serrulate, coriaceous, lucid; nerves much crowded, parallel; stipules

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[1] Sometimes slightly descending (Pl., in *Hook. Lond. Journ.*, loc. cit., 649) in *E. Hostmannia.*

[2] Small, yellow.

[3] Spec. 3, 4. Walp., *Rep.*, v. 400; *Ann.*, i. 179.

[4] *Fl. Ind.-Bat.*, Suppl., i. 534.—B. H., *Gen.*, 318, n. 5.

[5] "Mole nucis *Juglandis.*"

[6] Spec. 1. *T. glabra* Miq., *loc. cit.*—Walp., *Ann.*, vii. 544.

[7] *Gen.*, n. 354.—J., *Gen.*, 282 (part.).—Lamk., *Dict.*, iv. 509 (part.); Suppl., iv. 117 (part.); *Ill.*, t. 472.—DC., in *Ann. Mus.*, xvii. 410, t. 12–16; *Prodr.*, i. 735.—Spach, *Suit. à Buffon*, ii. 380.—Endl., *Gen.*, n. 5959.—Pl., in *Hook. Lond. Journ.*, v. 649.—B. H., *Gen.*, 317, n. 1.—Lem. & Done., *Tr. Gén.*, 370.—*Diporidium* Wendl. f., *Beitr.*, ii. 24.

axillary, 2-nate, free or connate; flowers[1] in simple or much oftener ramified compound racemes, often springing from squamose buds within one year old leaves; pedicels articulate (*All Trop. and Subtrop. regions of Old World*[2]).

II. EUTHEMIDEÆ.

5. **Euthemis** Jack.—Flowers hermaphrodite; sepals 5, often ciliate, imbricated, deciduous, or persistent. Petals same in number, longer, imbricated. Stamens 5, alternipetalous, or 10, of which 5 are alternipetalous, sterile; anthers fertile, subsessile, rostrate, 2-celled, poricidal at apex. Germen inserted on receptacle, slightly produced beyond androceum, semi-5-celled, elongated, produced at apex in subulate-acute style; ovules in each cell (alternipetalous) 2, descending; micropyle extrorse, superior. Berry pulpous, 5-pyrenous; pyrenæ fibrous, 1, 2-spermous; seeds descending; testa membranous; albumen fleshy; embryo axile, terete; radicle superior, elongated.—Glabrous shrubs; branches terete; leaves alternate, petiolate, coriaceous, lucid, sharply serrate; nerves crowded, parallel; stipules ciliate, caducous; flowers in terminal or leaf-opposed bracteate racemes, often in axil of each bract, 2-nate, bracteolate (*Malay Arch.*). See p. 367.

III. LUXEMBURGIÆ.

6. **Luxemburgia** A. S. H.—Flowers hermaphrodite; receptacle conical, suboblique. Sepals 5, unequal, sometimes ciliate, imbricated, deciduous. Petals 5, alternate, equal, imbricate-convolute, very patent. Stamens 4–8 or ∞, hypogynous; filaments very short, connate in posterior mass; anthers basifixed, linear, aggregate, 2-celled, 2-porous at apex. Germen excentric, lanceolate, sometimes very shortly stipitate, 3–5-agonal, apex in subulate acute narrow style; placentas 3–5, parietal, more or less prominent; ovules ∞,

[1] Pale yellow, often handsome; fructiferous receptacle often rather purple.

[2] Spec. 25. Roxb., *Pl. Coromand.*, t. 89.—Wight, *Ill.*, t. 69.—A. Rich., *Fl. Sen. Tent.*, i. 137, t. 35.—Harv. & Sond., *Fl. Cap.*, i. 448.—Kl., in *Pet. Moss., Bot.*, 88, t. 16.—H. Bn., in *Adansonia*, ix. 74.—Oliv. *Fl. Trop. Afr.*, i. 316.—Hook., *Icon.*, t. 588.—Thw., *Enum. Pl. Zeyl.*, 70.—*Bot. Mag.*, t. 4519.—Walp., *Rep.*, i. 527; ii. 826; v. 400; *Ann.*, i. 179; ii. 260; vii. 543.

inserted on the edges of placenta, recurved on both sides, ascending, anatropous. Capsule coriaceous, acute, 3–5-angular, 1-celled, septicidally 3–5-valved; seeds ∞, inserted on semiseptate margin, subimbricated; testa above or at margin membranous, winged or marginate; albumen scanty, fleshy; embryo terete.—Handsome ramified glabrous nitid trees or shrubs; twigs terete; leaves alternate, coriaceous, serrulate, teeth and apex ciliate; nerves crowded, parallel, perpendicular or oblique to ribs; stipules 2, ciliate; flowers in simple terminal racemes, fructiferous lateral; pedicels articulate above base, 2-bracteolate (*Brazil*). See p. 368.

7. **Godoya** R. & Pav.[1]—Flowers nearly of *Luxemburgia*; sepals 5, unequal (interior shorter), scarious, base inwardly fimbrilliferous, closely imbricated, deciduous. Petals 5, obovate, convoluto-imbricate or contorted. Stamens 10–20, secund declinate; filaments very short or almost wanting; anthers erect, declinate; cells 2, linear, sometimes transversely rugulose (*Rutidanthera*[2]), poricidal at apex.[3] Germen excentric, shortly stipitate, rostrate, minutely stigmatiferous at apex; cells 5, incomplete; ovules ∞, ascending, inserted on margin of placenta, reflexed on both side. Capsule more or less completely 5-celled, septicidal; valves 5, pendulous from 10-parted axis, finally separating. Seeds ∞, compressed, ascendent; embryo?—Fine trees; branches annulate, lenticellate; leaves alternate, coriaceous, simple (*Eugodoya*[4]), stipulate, crenate or serrate, sometimes pinnate[5] (*Rutidanthera*); flowers in terminal axillary simple or ramified cymiferous racemes (*Peru*; *N. Grenada*[6]).

8? **Cespedesia** Goud.[7]—Flowers nearly of *Godoya*; sepals 5, small, subequal, much imbricated, deciduous. Petals 5, longer, convolute. Stamens 10–∞, all fertile; sometimes sub-3-seriate; filaments free, short or elongated, thickened below apex; anthers basifixed, linear, 4-agonal, sometimes curved, 2-porous or 2-rimose at apex. Germen subexcentric, shortly stipitate, tapering at

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[1] *Prodr.*, 58, t. 11; *Syst.*, 101.—DC., *Prodr.*, i. 558.—Endl., *Gen.*, n. 5427.—Pl., in *Hook. Lond. Journ.*, v. 597, t. 19–22.—B. H., *Gen.*, 319, n. 9.—*Godovia* Pers., *Enchirid.*, i. 467.

[2] Pl., *loc. cit.*, 599, t. 19, 20.

[3] Pores sometimes prominent pale before dehiscence.

[4] Pl., *loc. cit.*, 596, t. 21, 22.

[5] "Tunc exstipulatis?" (B. H.).

[6] Spec. 2, 3. Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xviii. 272.—Walp., *Rep.*, i. 375; *Ann.*, i. 122, 176.

[7] In *Ann. Sc. Nat.*, sér. 3, ii. 369.—Pl., in *Hook. Lond. Journ.*, v. 645.—B. H., *Gen.*, 320, n. 11.

apex stigmatiferous at apex, simple, not dilated; placentas 5, or more rarely 4, parietal, more or less prominent, sometimes inwardly contiguous; ovules in each ∞, 2-seriate, ascending, crowded. Capsule incompletely 4, 5-celled, septicidally 4, 5-valved; placentas sometimes separating; seeds ∞, linear, small; testa pellucid, produced in filiform sheath; embryo albuminous, straight.—Large glabrous trees; secondary branches annulate; leaves alternate, large, coriaceous, oblong-ovate; base narrow, crenate; nerves distant, arched or substraight; secondary nerves crowded, subtransverse; stipules squamiform or sepaloid, inserted high up the petiole, sometimes inwardly furnished with filaments at base; flowers[1] in large terminal ramified cymiferous racemes[2] (*Trop. East. S. America*[3]).

9. **Blastemanthus** Pl.[4]—Flowers nearly of *Godoya;* sepals 5, passing externally into 2–5- or more rarely ∞, 2-stichous, imbricated bracts, the smaller lower;[5] closely in præfloration imbricate, deciduous. Petals 5, narrow, contorted or convoluted. Stamens fertile about 10, secund declinate, surrounded externally by staminodes 5–20, subulate or filiform, unequal; filaments short; anthers erect, elongate-linear, laterally 2-sulcate, rostrate, 2-porous at apex. Germen subexcentric, stipitate, fusiform, tapering into rostrate style, simple stigmatiferous at apex; cells 3–5, incomplete; ovules ∞, 2-seriate, inserted on placentas, recurved outwardly at margin, ascending, imbricated. Capsule fusiform, attenuated on both sides, rather terete, rostrate at apex, septicidally 2-valved; endocarp of each cell subpyreniform, subpergamentaceous, interior longitudinally hians; seeds ∞, linear; embryo . . . ?—Glabrous trees; leaves alternate, coriaceous; nerves very thin, parallel; stipules (?) above leaves dentiform, deciduous; flowers[6] in terminal and supra-axillary simple and compound cymiferous racemes, springing from squamous buds (*North Brazil, Guiana*[7]).

10. **Pœcilandra** Tul.[8]—Flowers nearly of *Godoya* (smaller); sepals

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[1] Rather large, handsome, yellow.

[2] Gen. very approximate to *Godoya*.

[3] Spec. 4. R. & Pav., *Syst.*, 102; *Fl. Per. ined.*, v. t. 359 (*Godoya*).—H. B. K., *Nov. Gen. et Spec.*, vii. 277 (*Marcgravia*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 4, xviii. 274.—Seem., *Voy. Her., Bot.*, 97.—Walp., *Ann.*, i. 178; iv. 421.

[4] In *Hook. Lond. Journ.* v. 644.—B. H., *Gen.*, 320, n. 9.

[5] Leaving on the top of the pedicel, after the decay of the budlike calyx, scars like sepals.

[6] As to corolla and stamens nearly like *Ouratea*, buds oblong gemmiform.

[7] Spec. 2. Mart. & Zucc., *Nov. Gen. et Spec.*, i. 118, t. 74 (*Godoya*).—Walp., *Ann.*, i. 177.

[8] In *Ann. Sc. Nat.*, sér. 3, viii. 342.—Pl., see *Linden*, 63.—B. H., *Gen.*, 320, n. 10.

5, unequal, closely imbricated. Petals 5, contorted. Stamens fertile 5, alternipetalous; filaments hypogynous; anthers basifixed, longer than filaments, articulate at apex; cells 2, linear, sulcate at margin, poricidal at apex. Staminodes ∞, 2-seriate; interior 5–∞, longer, alternating with stamens, subulate; exterior smaller, unequal, subulate or at apex subspathulate. Germen free, subexcentric, 1-celled, tapering into erect hollow style at summit; apex of style shortly 3-dentate stigmatiferous; ovules ∞, descending, inserted at margin of 3 parietal placentas. Capsule linear-elliptical, rather terete, septicidally 3-valved; seeds few; testa membranous, widely 3-winged; nucleus oblong; albumen fleshy; embryo axile, terete; cotyledons narrow. — A glabrous tree; leaves alternate, scarcely petiolate, obovate-oblong, crenulate, punctuate; nerves parallel; "stipules small, caducous;" flowers in terminal compound racemes; peduncles bracteate, and pedicels 2 bracteolate, ciliate[1] (*Guiana*[2]).

11. **Wallacea** Spruce.[3]—Flowers nearly of *Godoya;* sepals 5, elongated, lanceolate, imbricate, afterwards patulous. Petals same in number, longer, convolute. Stamens fertile 5, declinate; filaments short; anthers elongated; cells 2, linear, longitudinally rimose, and below apex confluent poricidal; staminodes exterior ∞, sub-3-seriate, from the exterior to the interior longer subulate. Germen subcentral, shortly stipitate, fusiform, apex tapering into long subulate style; placentas parietal 3; ovules ∞, subtransverse, ∞-seriate. Capsule ligneous, swollen, thick, unequally oblong-ovoid, acute on both sides, 2-valved. Seeds ∞, angular; testa thick; embryo . . . ?—Small glabrous trees; twigs annulate; leaves alternate, obovate-oblong, integerrimus; nerves crowded, striate; stipules elongate-convolute, sheathing upper leaves, deciduous; flowers[4] axillary, pedunculate, solitary or 2-nate; bractlets deciduous[5] (*North Brazil*[6]).

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[1] Gen. closely allied to *Sauvagesia*, as also very near to *Blastemanthus*.

[2] Spec. 1. *P. retusa* Tul., *loc. cit.*—Walp., *Ann.*, i. 123.

[3] Ex B. H., *Gen.*, 320, n. 12.

[4] Handsome, pink.

[5] Gen. allied to *Blastemanthus*, differing in inflorescence, staminodes sub-3-seriate, and leaves.

[6] Spec. 1. *W. insignis* Spruce, *loc. cit.*

XXXV. RUTACEÆ.

I. RUE SERIES.

The Rues (figs. 391–398[1]) have regular, hermaphrodite, penta-

Ruta graveolens.

Fig. 391.
Floriferous branch.

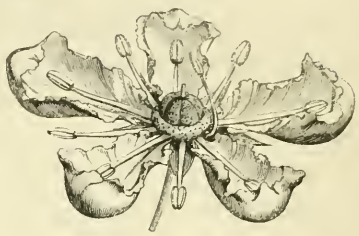

Fig. 392.
Flower ($\frac{4}{1}$).

Fig. 393.
Diagram.

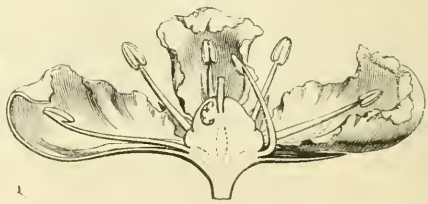

Fig. 394.
Longitudinal section of flower.

merous or tetramerous flowers.[2] In the former the convex receptacle

[1] *Ruta* T., *Inst.*, 257, t. 133; *Cor.*, 19.—L., *Gen.*, n. 523 (part.).—Adans., *Fam. des Pl.*, ii. 343.—J., *Gen.*, 297.—Poir., *Dict.*, vi. 333; Suppl., iv. 725.—Lamk., *Ill.*, t. 345.—DC., *Prodr.*, i. 709 (part.).—Turp., in *Dict. Sc. Nat.*, Atl., t. 122.—Spach, *Suit. à Buffon*, ii. 315.—A. Juss., in *Mém. Mus.*, xii. 462, t. 17, fig. 9.—Endl., *Gen.*, n. 6027.—Payer, *Organog.*, 73, t. 15.—B. H., *Gen.*, 286, n. 10.—Lem. & Dcne., *Tr. Gén.*, 361. — H. Bn., in *Adansonia*, x. fasc. 10 (incl.: *Desmophyllum* Webb, *Haplophyllum* A. Juss., *Ruteria* Medik.).

[2] Sometimes even hexamerous.

supports a slightly gamosepalous calyx, with deep divisions imbricated in the bud. The petals alternating with the divisions of the calyx are free, clawed, hollowed above into a spoon-shape, more or less cut upon the edges, and arranged in the bud in an imbricated or contorted præfloration. The stamens are ten in number, disposed

Ruta (*Euruta*) *graveolens.*

Fig. 396.
Seed ($\frac{7}{1}$).

Fig. 395.
Dehiscent fruit ($\frac{3}{1}$).

Fig. 397.
Long. sect. of seed.

upon two verticils, superposed five to the divisions of the calyx, and five shorter to the petals, each composed of a free filament and a basifixed,[1] two-celled anther dehiscing within or upon the edges by two longitudinal clefts.[2] Above them the floral receptacle dilates into a thick circular glanduliferous[3] disk surrounding the base of the gynæceum. This is formed of five oppositipetalous carpels, the ovaries of which are free,[4] one-celled, each surmounted by a style springing from the summit, and from within the ovary, free at the base, but proceeding to meet the other styles, and to unite with them in forming a column apparently single, surmounted by a very small stigmatiferous dilatation. In the internal angle of each ovary is a parietal placenta supporting an indefinite number of ovules, inserted in two ranks, anatropous, looking at each other by their raphes, subtransverse or more or less oblique, according to the height at which they are inserted.[5] The fruit, accompanied at its base by the dried calyx, is formed of five follicles longitudinally dehiscing

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[1] The successive and alternating movements of the stamens at the period of impregnation have drawn the attention of a great many observers. The filaments at first incline towards the style, afterwards spreading round the flower. At this moment the anthers are emptied of their pollen. The very pointed summit of the filament is often inserted at the bottom of a conical cavity, hollowed in the connective.

[2] The pollen is "ovoid, three folds; in water, round with three papillose bands." (H. Mohl., in *Ann. Sc. Nat.*, sér. 2, iii. 339.)

[3] The large glands are sometimes arranged on the disk with tolerable regularity, so as to correspond to the stamens, being placed alone or in pairs above the insertion of each.

[4] Except at the base, where they are slightly united among themselves, and especially connected with each other by that part of the receptacle upon which they are widely inserted.

[5] They have two coats.

above, according to their internal angle, and gaping within the summit, while their bases are united by means of the receptacle then become dry and pentagonal. The seeds, variable in number, are arched and triangular; they contain under their coats a fleshy oily albumen surrounding a large embryo with fleshy conical radicle. The Rues are perennial herbs or undershrubs. All their parts are endowed with a penetrating, often disagreeable odour, proceeding from translucid reservoirs of essential oil, more or less prominent, with which all the organs are charged. The leaves are alternate compound trifoliolate, pinnatisect or decompound, exstipulate.[1] Their flowers are disposed at the summit of the branches in cymes, pluriparous at the commencement, and generally becoming uniparous towards the circumference. In the Rues proper it is frequently the case that the central flower of the cyme is pentamerous; the others, although organized the same, becoming tetramerous. In those constituting *Haplophyllum*,[2] the leaves are generally simple;[3] the petals entire; the flowers almost constantly pentamerous; and the ovules few in number in each carpel.[4] In *Ruta pinnata* the ovary is divided into four or five cells through almost the whole height; and the fruit only opens incompletely at the summit (fig. 398), or even not at all. Thus formed, the genus Rue comprehends some forty species,[5] all natives of the Mediterranean region and of centro-western Asia.

Ruta (Ruteria) pinnata.

Fig. 398.
Fruit dehiscent at summit ($\frac{2}{1}$).

In *Ruta albiflora*, a small species of cool India and Japan, the delicate leaves of which are bipinnate, the flowers are white and small, united in a raceme of terminal cymes, tetramerous with four or six stamens, and the gynæceum supported by a slender foot

[1] In certain species the two inferior lobes of the leaf inserted quite against the branch seem to take the place of these organs.

[2] A. Juss., in *Mém. Mus.*, xii. 464, t. 17, fig. 10 (*Aplophyllum*).—Deless., *Ic. Sel.*, iii. t. 43, 44.—Endl., *Gen.*, n. 6028.—Spach, *Consp. Gen.* Haplophyllum (in *Ann. Sc. Nat*, sér. 3, xi. 171).

[3] Sometimes trisect; very rarely pinnatisect.

[4] L. f., *Suppl.*, 232.—DC., *Prodr.*, n. 1.—*Bot. Reg.*, t. 307.—*Ruteria pinnata* Medik.—*Desmophyllum pinnatum* Webb, *Phyt. Canar.*, i. 14.

[5] Reichb., *Ic. Fl. Germ.*, v. t. 155–157; *Pl. Crit.*, vii. 786–790.—Jacq., *Ic. Rar.*, t. 76.—Duham., *Arbr.*, ii. t. 61.—Sibth., *Fl. Græc.*, t. 368–370.—Ten., *Fl. Neap.*, t. 36.—Gren. & Godr., *Fl. de Fr.*, i. 328.—Labill., *Syr.*, Dec. i. t. 14.—Jaub. & Spach, *Ill. Pl. Or.*, iii. t. 261–270 (*Haplophyllum*).—Boiss., *Fl. Or.*, i. 931.—C. Gay, *Fl. Chil.*, i. 489.—Tchihatch., *As. Min. Bot.*, vii. 154.—*Bot. Mag.*, t. 2018, 2254 (*Haplophyllum*), 2311.—Walp., *Rep.*, i. 517, 518; ii. 824; v. 394 (*Haplophyllum*); *Ann.*, i. 156 (*Haplophyllum*); ii. 251; iii. 840 (*Haplophyllum*); vii. 507.

more or less elongated. On this account a distinct genus has been made of this plant under the name of *Bœninghausenia.*

Thamnosma, consisting of small plants of North-Western America, have the tetramerous flowers of the Rue; but the stipitate gynæceum is reduced to two carpels united to a much greater distance at their internal angle, so as to form almost one two-celled ovary.

In *Tetradiclis,* consisting of fleshy, many-stemmed herbs from the East, the flower is also tetramerous; but the androceum is isostemonous, and the four sub-independent ovaries constituting the gynæceum are separated from each other from their base by the central column represented by a single gynobasic style.

The Fraxinellas[1] have hermaphrodite or regular flowers, representing on that account a distinct subseries of *Dictamneæ.* Their calyx has five subequal sepals arranged in the bud in slightly imbricated præfloration. The corolla is formed of five alternate free petals, provided with a narrow claw. They are imbricated in the bud, so that the anterior covers the two lateral. These, in their turn, envelope the two posterior, one of which is covered on both edges. At anthesis the four posterior petals, almost alike, are projected from the side of the axis, and the anterior petal on the side of the axile bract.[2] The corolla thus appears bilabiate. Quite against the petals the stamens are inserted, superposed five to the sepals, and five, rather shorter, to the petals. They are free,[3] and composed of a filament bearing prominent glands,[4] and of a two-celled introrse anther opening longitudinally by two sublateral clefts.[5] The gynæceum is supported by a cylindro-conical foot, the base surrounded by a not very thick glandular[6] disk, upon the edges of which are articulated the staminal filaments. Upon the summit of the receptacle five oppositipetalous carpels are inserted. The ovaries are inde-

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[1] *Dictamnus* L., *Gen.*, n. 522.—J., *Gen.*, 297.—A. Juss., in *Mém. Mus.*, xiii. 467, t. 18, fig. 12.—Lamk., *Dict.*, ii. 277 (*Dictamus*); Suppl., ii. 476; *Ill.*, t. 344.—DC., *Prodr.*, i. 712.—Spach, *Suit. à Buffon*, ii. 323.—Endl., *Gen.*, n. 6024.—Payer, *Organog.*, 98, t. 21.—B. H., *Gen.*, 287, n. 13.—*Fraxinella* T., *Inst.*, 430, t. 213.—Gærtn., *Fruct.*, i. 337, t. 69.

[2] In the pink flowers the lateral petals are of a different tint from the upper.

[3] All declinate, projected sooner or later after anthesis, towards the anterior side of the flower.

[4] The tapering extremity is inserted at the bottom of a conical cavity at the base of the connective.

[5] Pollen "ovoid;" three folds; in water ovoid, with three bands and three papillæ on each band." (H. Mohl., in *Ann. Sc. Nat.*, sér. 2, iii. 339.)

[6] As this podogynium thickens more on the posterior side than in front, it acquires a greater size and elevation behind; the insertion of the gynæceum seems slightly excentric.

pendent among themselves, and each tapers above into a slender style, uniting with the others in forming a single column tapering and stigmatiferous at the apex. In the internal angle of each ovary is a parietal placenta generally supporting three anatropous ovules. Two of them are superior, more or less collateral, and more or less oblique, oftener ascending than descending.[1] If they were horizontal, as they are occasionally, the micropyle would be above the raphe, which would become inferior and horizontal. The inferior ovule is always descending; its raphe is dorsal; its micropyle directed inwards and upwards. The fruit is dry, stipitate formed of five rostrate shells, di- or tri-spermous, opening elastically into two valves, the horny endocarp separating from the exterior layers. The subglobular seeds contain under their coats[2] a fleshy albumen surrounding an embryo with short radicle and thick cotyledons. This genus only contains one species, herbaceous, perennial, or suffrutescent at the base, all the parts loaded with prominent glands secreting a very odoriferous essence. The leaves are alternate imparipinnate, with serrulate punctuate folioles. The flowers are disposed in terminal racemes of uniparous cymes. The single species of this genus[3] grows in southern Europe, and in all temperate Asia.

We remark, then, in this first small series of *Rutaceæ* that there are regular and irregular types, some with carpels independent of each other in the ovary, while the styles are united among themselves, and others in which the union extends to the ovaries themselves, but to a very variable extent, without other features of organization sufficiently clear to serve in distinguishing other genera. These differences are also found in other series of the family; they serve to distinguish one from the other, or to establish in certain of them subseries comparable to those which may be named here: *Euruteæ* (*Ruta*, *Bœnninghausenia*, *Thamnosma*, *Tetradiclis*), and *Dictamneæ* (*Dictamnus*).

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[1] With two coats.

[2] The exterior is smooth and black; the internal angle is occupied to about half its extent by a cicatrice, the separated edges exposing to view the middle coat, brown and little enduring. The interior is membranous and whitish.

[3] *D. Fraxinella* Pers., *Enchirid.*, i. 464.—Link., *Enum.*, i. 398.—Schkuhr., *Handb.*, t. 114.—Reichb., *Ic. Fl. Germ.*, v. 159.—Boiss., *Fl. Or.*, i. 920.—*D. albus* L., *Spec.*, 548.—DC., *Fl. Fr.*, iv. 734.—Gren. & Godr., *Fl. de Fr.*, i. 329.—Walp., *Rep.*, i. 517; *Ann.* vii. 509.

II. CUSPARIEÆ SERIES.

This series, the name of which might be modified,[1] contains, as the preceding, plants with regular and irregular flowers. Both are found united in the certain genera according to the species. Such is

Erythrochiton brasiliense.

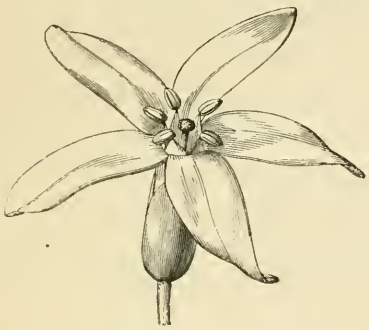

FIG. 399.
Flower.

FIG. 401.
Ovary and open disk.

FIG. 400.
Expanded calyx and disk.

Erythrochiton.[2] One species, frequently cultivated in our greenhouses under the name of *E. brasiliense*[3] (figs. 399–401), has hermaphrodite, distinctly regular flowers. The convex receptacle bears towards its summit a gynæceum, which is almost that of a Rue, with five oppositipetalous carpels, free in the ovary, united into a tubular style with five-lobed stigmatiferous head. But the perianth and androceum present peculiar characters. The gamosepalous, tubular, pentagonal, campanulate, valvate calyx is unequally cloven at anthesis,[4] and then seems bilabiate. The regular, gamosepalous, hypocrateriform corolla has a thick straight tube,[5] and a limb with five lobes, disposed in the bud in imbricated præfloration. The stamens seem to be inserted tolerably high upon the corolla because their filaments lining the tube are only disengaged from it towards the throat. There are seen the free summits of five filaments,

[1] Because it is taken from the name of the genus *Cusparia*, now abandoned.

[2] NEES & MART., in *Nov. Act. Nat. Cur.*, xi. 151, 165, t. 18, 22 (nec GRIFF.).—DC., *Prodr.*, i. 732.—A. JUSS., in *Mém. Mus.*, xii. 495. — ENDL., *Gen.*, n. 5992.—PAYER, *Organog.*, 101, t. 22.—B. H., *Gen.*, 284, n. 4.—AG., *Theor. Syst. Pl.*, t. 19, fig. 11.—H. BN., in *Adansonia*, x. fasc. 10. — *Pentamorpha* SCHWEIDL. (ex WALP., *Rep.*, v. 387).

[3] NEES & MART., *loc. cit.*—*Bot. Mag.*, t. 4742. — *Pentamorpha graveolens* SCHWEIDL., *loc. cit.*—WALP., *Rep.*, v. 387.

[4] In two or three unequal lobes.

[5] This tube is pentagonal, and its angles correspond to the dorsal nerves of the lobes.

each surmounted by a two-celled introrse anther dehiscing by two longitudinal clefts. An elevated conical disk hides all the lower part of the gynæceum; that is to say, the five free oppositipetalous ovaries, surmounted by their styles, which starting from the inner angle unite among themselves in forming a tubular column, with a five-lobed capitate stigmatiferous apex. In the internal angle of each ovary is seen a placenta supporting two descending anatropous ovules with superior exterior micropyle.[1] The fruit, accompanied by the persistent calyx, consists of five independent bivalved shells, the bivalve exocarp thin, although at first fleshy, elastically separating from the pergamenous endocarp at maturity. Each contains two arched seeds with umbilicus rugose, muricate, or tubercular on the surface, containing under their coats[2] a scanty albumen and a large embryo, with short superior fornicate radicle. The cotyledons, one dorsal the other central, form numerous folds, and are closely enveloped by each other.

E. brasiliense presents here and there in cultivation abnormal flowers, whose androceum has unequal pieces, one of them sometimes sterile. This sterility in a certain number of stamens is the rule in most of the other species of this genus. The corolla then becomes more or less fornicate; the lobes of the limb are slightly unequal and imbricate. Only two of the five alternipetalous stamens are provided with anthers; and there are belonging to the androceum five other sterile tongues, two of which, smaller than the others, are superposed to the two divisions of the corolla, and consequently belong to another verticil. These facts are especially observed in *E. hypophyllanthus*,[3] a species, moreover, remarkable for the position of the inflorescence.

Erythrochiton consists of glabrous shrubs, with simple or slightly ramified stems, five or six species[4] of which are known, natives of Brazil, Guiana, Columbia, Ecuador. The alternate leaves are

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[1] With two coats.

[2] The exterior coat is thin and soft, covered with numerous small ribs like short hairs. The second layer is a blackish testa, dry and brittle, lined inwardly by a thin brownish membrane. Under the micropyle on the internal edge of the seed a large depression of the testa is seen corresponding with the hilum. A soft white projection of the placenta is there inserted. But lower towards the region of the chalaza there is a sort of operculate circular hard blackish plug, above which the external cellular membrane is much thinner than elsewhere, and covered less abundantly with hairs. This arrangement renders more visible this opercule, which recalls to some extent that of the seed of *Cochlospermum*. (See p. 298, note 2).

[3] Pl. & Lind., in *Ann. Sc. Nat.*, sér. 3, xix. 75.—*Bot. Mag.*, t. 5824.

[4] Hook., in *Bot. Mag.*, t. 472. — Walp., *Rep.*, v. 387; *Ann.*, iv. 410; vii. 506.

united in bunches at the summit of the stem and branches, are elongated, unifoliolate, and entire. The flowers[1] present fine examples of what is termed localized inflorescence; they are usually disposed in alternate few-flowered cymes upon separate axes, often elongated, angular, and sometimes bearing leaves, and which after a longer or shorter rest, produce new cymes slightly distant from the preceding ones. These axes are separated from the stalk on a level with a leaf, whose axil they cannot be said to occupy, as they correspond with that of a leaf situated lower down, and from which they have been drawn up the stem to a higher level; sometimes even, as in *E. hypophyllanthus*, they have been raised to a certain height along the midrib of an upper leaf, the inferior face of which then bears the floral cymes.

Beside *Erythrochiton* are placed several very analogous genera, some having regular, and others irregular flowers. The former are:

Spiranthera odoratissima.

FIG. 402.
Flower.

FIG. 404.
Gynæceum.

FIG. 403.
Long. sect. of flower.

Almeidea, having five imbricated petals, the same number of fertile stamens with free filaments barbate within, the sessile gynæceum of *Erythrochiton*, and unifoliolate leaves; *Spiranthera* (figs. 402–404),

[1] With white or pink corolla; calyx generally red or greenish round the fruit.

whose five fertile stamens have slender filaments, the ovary being stipitate, and the leaves trifoliolate; *Leptothyrsa*, with tetramerous

Galipea macrophylla.

FIG. 405.
Flower ($\frac{3}{1}$).

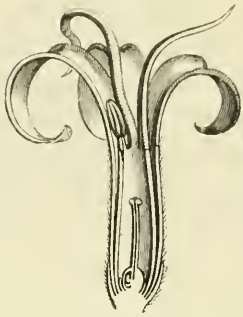

FIG. 406.
Long. sect. of flower.

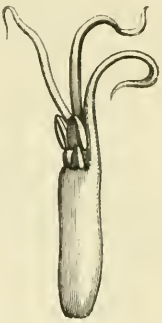

FIG. 407.
Androceum.

FIG. 408.
Gynæceum.

flowers, equal stamens, and having slender filaments, a sessile ovary of four carpels, and simple leaves. The genera of irregular flowers

Ticorea jasminiflora.

FIG. 409.
Flower.

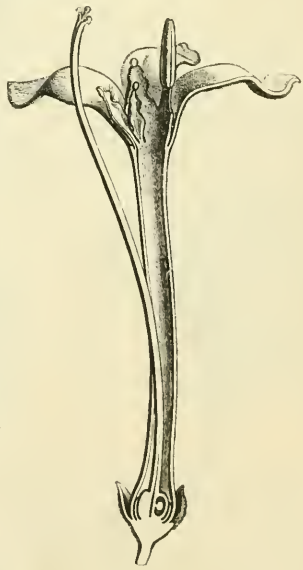

FIG. 411.
Longitudinal section of flower.

have stamens united with the corolla, or lining it for a certain distance, a certain number of them remaining sterile, as in the

species of *Erythrochiton*, with irregular corolla. These are : *Toxosiphon*, with five triangular valvate sepals free to the base persisting round the fruit, a polypetalous corolla, the pieces of which are united in a

Ticorea jasminiflora.

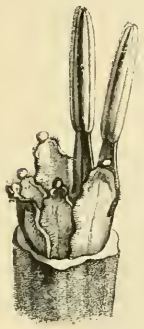

Fig. 412.
Summit of androceum.

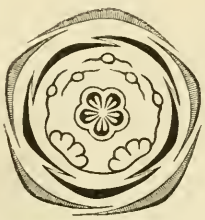

Fig. 410.
Diagram.

Fig. 413.
Gynæceum.

fornicate tube free above and below, with the limb not dilated, and five stamens, three of which are sterile, adhering by their filaments (distinct from each other) to the petals, united among themselves

Ravenia rosea.

Fig. 414.
Flower.

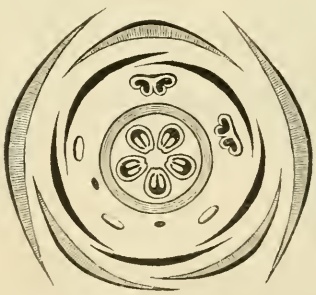

Fig. 415.
Diagram.

towards the middle of their height, and whose leaves are unifoliolate. *Galipea* (figs. 405–408) with inappendiculate anthers and alternate, simple, or 1–7-foliolate leaves ; *Ticorea* (figs. 409–413), a genus

scarcely distinct from the preceding, but in which the anthers are appendiculate below, the leaves being simple or 1–3-foliolate, alternate, or opposite; *Ravenia* (figs. 414, 415), with calyx formed of two wide sepals and three small ones, imbricated. It has a corolla with wide tube slightly elongated, two large fertile stamens, and five unequal staminodes, a regular disk, and opposite leaves 1–3-foliolate; finally *Monnieria*, consisting of herbaceous species with alternate 3-foliolate leaves, unequal sepals, subbilabiate corolla, with five stamens, only two of which are fertile, and a gynæceum, accompanied by a unilateral scale, alone representing the disk.

III. DIOSMA SERIES.

This series, entirely formed of plants from South Africa, derives its name from the genus *Diosma*, which alone represented it formerly.

Coleonema album.

Fig. 417.
Flower ($\frac{6}{1}$).

Fig. 416.
Floriferous branch.

Fig. 418.
Long. sect. of flower.

It is at present divided into several secondary genera, among which the true *Diosma* can no longer be considered as a complete type, inasmuch as their androceum is reduced to a single verticil. Other genera, on the contrary, separated from the old genus *Diosma*, such

as *Coleonema*[1] (figs. 416–421), have flowers whose androceum possesses two verticils. They are, moreover, regular, hermaphrodite and pentamerous. The receptacle, slightly convex, or more or less concave, often bears five sepals, whose insertion is consequently either hypogynous or more or less perigynous, and the præfloration imbricated. The alternate petals, whose insertion is the same, are free, oboval, tapering below into a thick claw, hollowed within on the middle line of a vertical groove in which the superposed staminodes are found. The præfloration is imbricated. The stamens are ten in number, superposed, five to the petals, and five to the sepals. These last alone are fertile, each formed of a two-celled introrse anther, dehiscing by two longitudinal clefts, surmounted by a small glandular swelling of the connective, often spherical. Within the insertion of the androceum the receptacle is thickened into a cupuliform disk, entire or five-lobed, varying in height and situation according to the form of the receptacle itself.

Coleonema album.

Fig. 419. Petal, upper face ($\frac{10}{1}$).

Fig. 420. Flower, perianth taken away.

Coleonema pulchrum.

Fig. 421. Fruit ($\frac{4}{1}$).

The gynæceum, entirely or partly superior, is inserted towards the organic summit of the receptacle; it is composed of five oppositipetalous carpels, whose independent one-celled ovary, often surmounted by a dorsal horn, more or less prominent,[2] contains two descending ovules, with superior exterior micropyle.[3] Each ovary is surmounted by a style, inserted at a variable height in the internal angle, uniting with the other styles to form an erect column with capitate, stigmatiferous apex, more or less distinctly five-lobed. The fruit is formed of five compressed shells, rugose, corniculated at the summit, the endocarp separating from the exterior layers at dehiscence; each of these con-

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[1] Bartl. & Wendl., *Diosm.*, 55, t. A.—Spach, *Suit. à Buffon*, ii. 328.—A. Juss., in *Mém. Mus.*, xii. 471, t. 19, fig. 17.—Endl., *Gen.*, n. 6016.—B. H., *Gen.*, 289, n. 20.

[2] Often thickened, glandular at the summit.

[3] With very distinct double coat.

tains one or two seeds whose coats cover a fleshy exalbuminous embryo.

Coleonema has sometimes tetramerous or hexamerous flowers. It consists of small ericoidal shrubs, natives of tropical Africa. In the four known species,[1] the branches are slender, and the leaves alternate, linear-pointed, odorous, covered with glandular punctures, with smooth, ciliate or serrulate edges. The flowers are terminal, solitary or united in few-flowered cymes, each accompanied by one or two bractlets applied against the base of the calyx.

Beside *Coleonema* are placed seven very nearly allied genera, so nearly allied in fact, that they might perhaps be united into one generic group. All are from the same country, having the same habit and the same vegetative organs, the same glandular reservoirs, almost the same flowers, and fruits and seeds of the same organization. Their differential characters are inconsiderable. Thus *Adenandra* consists of *Coleonemas* with sterile stamens not hidden in the groove of the petals, naked and subsessile. The anthers are surmounted by a stipitate gland. The styles unite into a short column capitate and stigmatiferous at apex. *Acmadenia* consists of *Adenandræ*, whose petals have a barbate or ciliate claw; and if their anthers are surmounted by a gland, it is sessile. *Agathosma*, with the petals of *Acmadenia*, has styles forming by their union an elongated column whose stigmatiferous apex does not dilate into a lobed head. *Barosma* has petals with a short glabrous claw, and the style of *Agathosma;* but the flowers are axillary and not terminal, as in all the preceding genera. The true *Diosmæ* are now only considered as plants whose flower is that of an *Adenandra*, as to the conformation of the gynæceum, but having only five fertile stamens, alternating with the petals. There is also an isostemonous character in *Euchætis* and *Macrostylis*. Both have unguiculate petals, transversely barbate; but the former has the short capitate style of *Adenandra* or *Diosma*, and the latter the elongated non-thickened apex of *Barosma* or *Agathosma*, with the terminal inflorescence of the latter.

This series also contains some exceptional types: *Empleurum*, with tetramerous, apetalous, monœcious flowers, and a gynæceum reduced

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[1] Thunb., *Fl. Cap.*, ii. 126 (*Diosma*). — Harv. & Sond., *Fl. Cap.*, i. 377.—*Bot. Mag.*, t. 2332.—Walp., *Ann.*, vii. 511.

[2] White or pink; small.

to one carpel. *Empleuridium*, the flowers of which have four petals, but are dicœcious, with the fruit of *Empleurum*; finally, *Calodendron*, with beautiful large flowers, much recalling by their perianth and diplostemonous androceum, those of *Spiranthera* and *Dictamnus*, but with a gynæceum exceptionally formed of carpels united into one ovary, with five biovulate cells, to which succeeds a five-celled and loculicidal capsule.

IV. BORONIA SERIES.

The flowers of *Boronia*[1] (figs. 422, 423) are very analogous to those of the Diosmas of South Africa, regular, hermaphrodite, and generally tetramerous. The receptacle, usually convex, supports four imbricated or valvate sepals, free or slightly united at the base, four alternate petals imbricated or valvate, and eight stamens, four of which, oppositipetalous, shorter, are sometimes sterile, while the four others have a two-celled introrse anther, dehiscing by two longitudinal clefts. Within the insertion of their filaments, glandular or ciliate, often dilated at the apex, is seen a more or less thickened disk, entire or four-lobed, surrounding the gynæceum. This is composed of four oppositipetalous, biovulate carpels, formed exactly like those of *Diosma*. It is the same with the capsular fruit, whose shells, with separable endocarp contain one or two seeds each. Under the coats of the latter a fleshy albumen is found surrounding an axile subcylindrical embryo. *Boronia* consists of small shrubs from Australia, principally the south-eastern regions. More than some fifty species[2] are actually admitted. The leaves are opposite, simple or imparipinnate, sometimes trifoliolate, with folioles entire

Boronia serrulata.

FIG. 422. Flower ($\frac{2}{1}$).

FIG. 423. Diagram.

[1] SM., in *Trans. Linn. Soc.*, viii. 285, t. 5–7. —GÆRTN. F., *Fruct.*, iii. 156, t. 211.—A. JUSS., in *Mém. Mus.*, xii. 482, t. 22, fig. 26.—DC., *Prodr.*, i. 721. — SPACH, *Suit. à Buffon*, ii. 338.—ENDL., *Gen.*, n. 6004.—B. H., *Gen.*, 291, 989, n. 28.—H. BN., in *Adansonia*, x. 302.—*Cyanothamnus* LINDL., *Swan Riv. Bot.*, 18. —ENDL., *Gen.*, n. 6005.— B. H., *Gen.*, 292, n. 29.

[2] LABILL., *Pl. Nouv.-Holl.*, i. 97, t. 124, 125. —SIEB., in *Spreng. Syst., Cur. Post.*, 148.—REICHB., *Ic. Exot.*, t. 73, 74. — SWEET, *Fl. Austral.*, t. 19, 48.—LINDL., *Swan Riv. Bot.*, 17; in *Mitch. Trop. Austral.*, 298; in *Bot.*

or denticulate, quite covered with glandular odorous aromatic points. The rachis and folioles are generally articulate. The flowers are axillary or terminal, sometimes solitary, sometimes in more or less ramified biparous cymes.

Boronella, consisting of plants growing in New Caledonia, is distinguished from *Boronia* by its decussate unequal sepals, its uniovulate ovaries, and almost erect orthotropous ovules.

Zieria (figs. 424, 425), composed of Australian shrubs, is also nearly allied to *Boronia*, to which it has been even proposed that it should be united, the only difference being in its four alternipetalous stamens, lined within their base by a larger or smaller gland. *Zieridium*, with its uniovulate ovaries and suborthotropous ovules, is to *Zieria* what *Boronella* is to *Boronia*. *Acradenia* consists of species of *Boronia*, with 4–8-merous flowers, imbricated petals, and ovaries containing two collateral ovules capped by an obturator. In a secondary group of *Eriostemoneæ*, the leaves are alternate and simple.

Zieria Smithii.

Fig. 424.
Flower ($\frac{3}{1}$).

Fig. 425.
Long. sect. of flower.

The genus *Eriostemon* (figs. 426–428) itself has 4–5-merous flowers, an imbricated, rarely subvalvate corolla, and a diplostemous androceum, the eight or ten stamens having anthers more or less long-apiculate. *Microcybe* only differs from it by an often incomplete calyx, represented by leaves varying in number from one to five. The corolla is pentamerous and imbricated; the androceum formed of ten stamens longer than the petals, and the gynæceum composed of only two carpels. It has flowers grouped in capitules. In *Geleznovia* also with alternate leaves, 4–5-merous, flowers may be observed constructed like those of *Boronia;* but the

Eriostemon (*Crowea*) *salignum.*

Fig. 426.
Flower.

Reg. (1841), sub n. 47.—A. Cunn., in. *Field N. S.-Wal.*, 330.—Andr., *Bot. Repos.*, t. 606.—Hook., *Icon.*, t. 722. — Endl., *Nov. Stirp. Dec.*, 6; in *Hueg. Enum.*, 16.—Nees, in *Pl. Preiss.*, ii. 227. — Bartl. in *Pl. Preiss.*, i. 166. — Turcz., in *Bull. Mosc.* (1852), ii. 160. — F. Muell., in *Hook. Kew Journ.*, viii. 38; *Fl. Vict.*, i. 109; *Fragm.*, i. 3, 66, 98; ii. 97, 177, 179, 180; iv. 28, 135, 172.—Benth., *Fl. Austral.*, i. 307.—A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 330.—*Bot. Mag.*, t. 1763, 4052.—Walp., *Rep.*, i. 502, 503 (*Cyanothamnus*); v. 388; *Ann.*, ii. 217; iv. 411; vii. 516.

sepals are petaloid, much more developed than the corolla, and persistent. *Philotheca*, the flowers of which are pentamerous, may, however, be considered as a species of *Boronia*, with monadelphous

Eriostemon (*Phebalium*) *elæagnifolium*.

Fig. 427.
Flower ($\frac{4}{1}$).

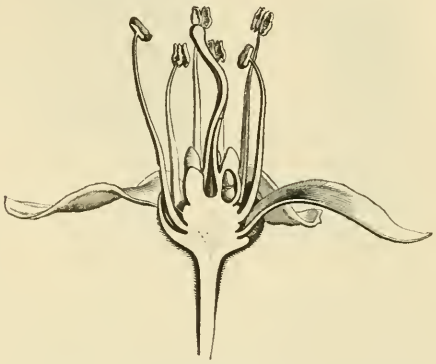

Fig. 428.
Longitudinal section of flower.

stamens, five of which, superposed to the petals, are sometimes sterile, surmounted by a small glandular mass. *Nematolepis* has also the pentamerous flowers of *Boronia*, small, and generally united in small capitate masses, with ten fertile stamens; but the petals are united edge to edge in an elongated tube, and the base of their staminal filaments is lined within by a scale covered with hairs.

Correa speciosa.

Fig. 429.
Flower.

Fig. 430.
Long. sect. of flower.

Correa (figs. 429, 430) has the numerous flowers, the petals of *Nematolepis* generally joining or resolving themselves into a tube, so that the corolla is often described as gamopetalous. The stamens are double in number to the petals, and all fertile; but the leaves are opposite. In *Urocarpus*, the leaves become alternate, and the flowers are nearly those of *Eriostemon*; but the carpels are united into one ovary with several cells. *Pleurandropsis* has, on the contrary, independent carpels, but closely adhering among themselves, except in the thick part of the reflexed stigmatiferous part, five yellow petals with about a dozen stamens,

and they are destitute of real sepals, the leaves or upper bracts of the small branches terminated by the flowers taking their place. In a last small group to which the *Chorilæna* should give its name, the flowers, although united in cymes, are collected in one inflorescence, like a capitulum; they are, moreover, constructed like those of a *Boronia* or *Philotheca;* while in *Diplolæna* (figs. 431, 432), whose inflorescence has also been compared to that of *Compositæ* (it really resembles a true capitulum), the flowers, destitute of calyx, small, numerous, and crowded, are sessile upon a receptacle with a flat surface, surrounded by a large number of imbricated bracts forming an involucre.

Diplolæna Dampieri.

FIG. 431. Inflorescence.

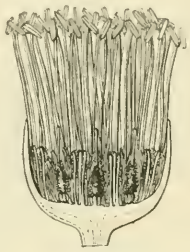

FIG. 432. Long. sect. of inflorescence ($\frac{3}{2}$).

V. ZANTHOXYLON SERIES (Fr., *Clavelier*).

We must not take as the type of the genus *Zanthoxylon*[1] the only species which, being cultivated in the gardens in France, flourishes there nearly all the year—viz., *Zanthoxylum fraxineum*[2] (figs. 433–438), as its flowers, generally dicœcious, are destitute of corolla, and differ from each other as to the number of their sepals and sexual organs; while in the most perfect species of the genus, pentamerous and polygamous flowers are observed. Those which are hermaphrodite, in this case bear upon a convex receptacle five sepals, free or united at the base for a variable extent, imbricated in the bud, and five alternate petals, imbricated or valvate in præfloration. The androceum is formed of an equal number of stamens, alternate with the petals, each having a free filament, and a

[1] *Zanthoxylum* L., *Gen.*, n. 1109 (part.).—J., *Gen.*, 374.—DC., *Prodr.*, i. 725.—A. Juss., in *Mém. Mus.*, xii. 503, t. 25, fig. 38.—Spach, *Suit. à Buffon*, ii. 363.—A. Gray, *Gen. Ill.*, t. 156.—B. H., *Gen.*, 297, 991, n. 51.—Schnizl., *Iconogr.*, xi. t. 250.—H. Bn., in *Adansonia*, x. 324.—*Zanthoxylon* H. B. K., *Nov. Gen. et Spec.*, vi. 1.—Endl., *Gen.*, n. 5972 (incl.: *Blackburnia* Forst., *Curtisia* Schreb., *Fagara* Lamk., *Kampmannia* Rafin., *Lacaris* Ham., *Langsdorfia* Leandr., *Macqueria* Commers., *Ochroxylum* Schreb., *Pentanoma* Moç. & Sess., *Perijæa* Tul., *Pohlana* Nees & Mart., *Pterota* P. Br., *Rhetsa* Wight & Arn., *Tobinia* Desv., *Typalia* Dennst.).

[2] W., *Spec.*, iv. 757.—DC., *Prodr.*, i. 726, n. 24.—Lem. & Dcne., *Tr. Gén.*, 365.—*Z. americanum* Mill., *Dict.*, n. 2.—*Z. Clava-Herculis* L., *Spec.*, 1455 (nec DC., *loc. cit.*, n. 30).—*Z. caribæum* Gærtn. (nec Lamk.).—Duham., *Arbr.*, i. t. 97.—*Z. ramiflorum* Michx., *Fl. Bor.-Amer.*, ii. 235.

two-celled, introrse anther, dehiscing by two longitudinal clefts.[1] The carpels, supported by a foot formed by a prolongation of the receptacle, more or less thickened at the base into a glandular

Zanthoxylum fraxineum.

FIG. 433.
Female inflorescence.

FIG. 434.
Female flower ($\frac{4}{1}$).

FIG. 435.
Long. sect. of female flower ($\frac{6}{1}$).

FIG. 436.
Dehiscent fruit ($\frac{3}{4}$).

disk, are free, superposed to the petals; each of them comprises a one-celled ovary, surmounted by a style dilated stigmatiferous at the apex, free or uniting with that of the other styles. In the internal angle of the ovary is a vertical placenta supporting two descending ovules, collateral, or nearly so, with the micropyle, directed upwards and outwards.[2] In the female flowers, the stamens are rudimentary, reduced to filaments or entirely disappearing. In the male flowers, the receptacle is much less elongated, and the carpels rudimentary or nil; the fruit is composed of shells, drupaceous, or finally dry,[3] dehiscing vertically to a variable distance in two lateral panels,[4] allowing a seed to escape, generally supported by a long funicle (fig. 436), and containing under its thick blackish shining coats[5] a fleshy albumen, enveloping a straight arched or fornicate embryo, with foliaceous cotyledons, and a short superior radicle.

Zanthoxylum fraxineum.

FIG. 437.
Seed ($\frac{3}{1}$).

FIG. 438.
Long. sect. of seed.

[1] The pollen is formed of ellipsoidal grains with three grooves. In water they become oval or spherical with three bands with (*Z. instrumentarium*) or without (*Z. triphyllum*) papillæ upon the bands. (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 339.)

[2] They have two coats.

[3] The outer service is sprinkled with glandular odorous reservoirs.

[4] The thin endocarp often separates at the moment of dehiscence from the more exterior layer of the pericarp.

[5] In the seed of *Z. fraxineum* are distinguished: externally, a smooth membrane shining, thin, and black; more internally, a testaceous, thick, blackish coat; then round the albumen a third layer, soft, pale, and membranous.

Instead of being provided with a corolla, as in the species of which it has been proposed to make the subgenus *Fagara*,[1] the *Zanthoxylons* may have, as we have seen, apetalous flowers; they belong in this case to the subgenus *Euzanthoxylum*.[2] In both the number of the pieces in the verticil of the perianth and androceum varies from two to six, and that of the carpels from five or six to only one; sometimes, again, the perianth becomes rudimentary, or is totally wanting. In an American species, as yet imperfectly known, which has received the significant name of *Z. syncarpum*,[3] the carpels, instead of being independent, are united into a plurilocular ovary; but we are unable at present to make this species anything but a subgenus, although it has been proposed to distinguish it generically under the name of *Perijæe*.[4] Thus comprised, the genus *Zanthoxylon* comprehends about eight species,[5] arborescent or frutescent, glabrous or pubescent, unarmed or thorny,[6] natives of all hot regions. The leaves are alternate, usually compound imparipinnate, more rarely reduced to three folioles or one; these are generally opposite, articulate, and always besprinkled with glandular punctures. The flowers[7] are disposed in the axil of the leaves at the summit of the branches, in spikes or racemes of cymes more or less ramified, with pedicels generally articulated.

Beside *Zanthoxylon* are placed several very nearly allied genera: *Evodia*, only absolutely distinguished from it by its opposite

[1] L., *Gen.*, n. 1109.—Lamk., *Dict.*, ii. 626; *Ill.*, t. 84.—Turp., in *Dict. Sc. Nat.*, Atl., t. 127.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 5, xiv. 310. — *Pterota* P. Br., *Jam.*, 146, t. 5. — *Tobinia* Desvx., in *Ham. Prodr. Fl. Ind. Occ.*, 56. — Griseb., *Fl. Brit. W.-Ind.*, 136. — *Rhetsa* Wight & Arn., *Prodr.*, i. 147. — *Typalia* Dennst., *Hort. Malab.*, v. 34. — *Lacaris* Ham. (ex *Wall. Cat.*, n. 7119).—*Macqueria* Commers. (ex J., *Gen.*, 374.—A. Juss., *loc. cit.*, t. 38 *c*).—*Kampmannia* Rafin., in *N.-York Med. Repos.*, ii. hex. v. 350. — *Ochroxylum* Schreb., *Gen.*, 826. — *Curtisia* Schreb, *op. cit.*, 199 (nec Ait.).—*Pentanome* Moç & Sess., *Fl. Mex. ined.* (ex DC., *Prodr.*, n. 2).—*Langsdorfia* Leandr., in *Act. Monac.* (1819), 229.—*Pohlana* Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 185.—*Blackburnia* Forst., *Char. Gen.*, t. 6.—DC., *Prodr.*, i. 83.—A. Juss., in *Mém. Mus.*, xii. 510. — Endl., *Gen.*, n. 5973.—*Blackbournea* K., in *Ann. Sc. Nat.*, sér. 1, ii. 356.

[2] Endl., *Gen.*, n. 5972 *a*.—Tr. & Pl., *loc. cit.*, 310.

[3] Tul., in *Ann. Sc. Nat.*, sér. 3, vii. 279.

[4] Tul., *loc. cit.*, 280.—Tr. & Pl., *loc. cit.*, 309.

[5] A. S. H., *Fl. Bras. Mer.*, i. 74, t. 15; *Pl. Us. Bras.*, n. 37; *Pl. Rem. Brés.*, i. 150.—Torr. & Gr., *Fl. N.-Amer.*, i. 214.—Tul., in *Ann. Sc. Nat.*, sér. 3, vii. 272.—Griseb., *Fl. Brit. W.-Ind.*, i. 136–138.—Tr. & Pl., *loc. cit.*, 311.—Harv. & Sond., *Fl. Cap.*, i. 445.—A. Gray, *Unit.-St. Expl. Exp., Bot.*, i. 354; *Man.*, ed. 5, 75.—Chapm., *Fl. S. Unit.-St.*, 66.—C. Gay, *Fl. Chil.*, i. 482.—Oliv., *Fl. Trop. Afr.*, i. 304.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 670; Suppl., t. 532.—Benth., *Fl. Austr.*, i. 362.—Walp., *Rep.*, i. 519; ii. 825; v. 396; *Ann.*, i. 157; ii. 208; iv. 414; vii. 527.

[6] Sometimes they bear prickles, straight or curved, scattered over the stems, petals, stalks, and the nerves of the leaves; sometimes they are thorns like pads, seeming to take the place of stipules.

[7] Small white or greenish, glandular, odoriferous, sometimes without perianth. They often open in spring, before the development of the leaves.

leaves, and whose androceum is sometimes isostemonous, and sometimes diplostemonous; *Bouchardatia*, having opposite trifoliolate

Medicosma Cunninghami.

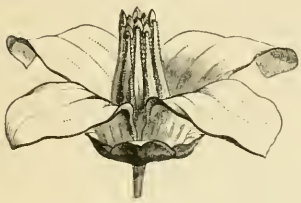

FIG. 439.
Flower ($\frac{3}{2}$).

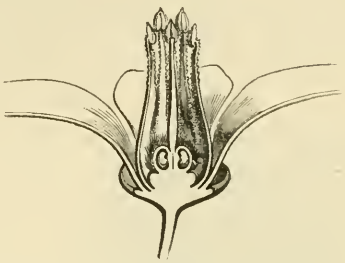

FIG. 440.
Longitudinal section of flower.

leaves and hermaphrodite tetramerous diplostemonous flowers, with an imbricated corolla and ovaries containing an indefinite number of ovules arranged in two vertical ranks; *Bosistoa*, with pinnate leaves, pentamerous flowers, valvate petals, a disk prominent in the interval of the stamens, and four or five ovules in each carpel; *Pagetia*, with opposite simple or trifoliolate leaves, pentamerous and diplostemonous flowers, the corolla subvalvate, and the ovaries 4–6-ovulate; finally, *Geijera*, with hermaphrodite, isostemonous flowers in four or five parts, surbased receptacle, valvate corolla, and a glandular circular even disk, with more or less gynobasic style. The leaves are simple and alternate, and the flowers disposed in ramified cymes at the summit of the branches, or on the wood of the secondary branches.[1]

Medicosma Cunninghami.

FIG. 441.
Flower without corolla ($\frac{3}{1}$).

FIG. 442.
Gynæceum ($\frac{4}{1}$).

[1] It is only with extreme hesitation that we have provisionally placed in this group a plant whose organization is but very imperfectly known to us, and of which we have only been able to study the female flowers. It is *Didymeles* (DUP.-TR., *Gen. Nov. Madag.*, n. 89; *Hist. Vég. Iles Afr. Austr.*, 9, t. 1;—ENDL., *Gen.*, n. 6845), whose place has hitherto been uncertain, and which is distinguished from all the other types of this group inasmuch as it is a tree with alternate simple petiolate leaves entire, and not punctuate at the adult age. The flowers are dicœcious and disposed, it is said, the males in compound racemes, the females in spikes, with a perianth represented by two small leaves. In the male flower two stamens alternating

Choisya has larger flowers than *Geijera*, very analogous to those of *Boronia* and *Diosma*, from which they cannot be nicely distinguished so long as the seeds are unknown. The five petals are contorted; the androceum is diplostemonous, and the five independent ovaries biovulate; while the leaves are opposite and trifo-

Peltostigma pteleoides.

FIG. 443.
Flower.

FIG. 444.
Longitudinal section of flower ($\frac{2}{1}$).

liolate, and the flowers disposed in biparous cymes. *Medicosma* (figs. 439–442) has also opposite leaves, but simple and tolerably large tetramerous flowers, with contorted or imbricated petals. The androceum is diplostemonous, and the carpels independent in the ovary. *Platydesma* may perhaps be defined: a *Medicosma*, with ovaries not completely independent of each other, and each including from four to six biseriate ovules. *Dutaillyea*, a New Caledonian plant, has the same tetramerous flowers as the two preceding genera, with a single four-celled ovary, an isostemonous androceum, and opposite trifoliolate exstipulate leaves.[1]

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with these leaves are indicated, represented by anthers "sessile cuneiform, united at the base with extrorse dehiscence," two-celled. In the female flowers there are two independent carpels described as superposed to the sepals; each is formed of a one-celled ovary, surmounted by a short style immediately dilated into a large head, like a crest rolled up, quite covered with a stigmatic papilla, and traversed by a middle groove descending by the internal edges of the ovary. Corresponding to this border is a placenta, supporting a descending ovule with exterior and superior micropyle prolonged into a sinuous tube, dilated at the apex. The fruit is described as formed of one or two drupes with a bony stone. The descendent monospermous seed contains a large fleshy embryo, with plano-convex cotyledons and short radicle. By these characters the plant would seem as though it might be considered as a reduced type of *Zanthoxylon*. The only species known is *D. excelsa* (*D. madagascariensis* W.).—*Anthæa excelsa* NOR. & DUP.-TH., *loc. cit.* — *Didymomeles madagascariensis* SPRENG.

[1] The two genera *Astrophyllum* and *Peltostigma* (figs. 443, 444) are doubtfully placed here. The former because the only flower which we have been able to study did not belong with certainty to the specimen accompanying it; it may be thus defined:—A *Zanthoxylon* with squami-

Melanococca belongs to a small abnormal subseries in this group, as its flowers, otherwise constructed like those of *Zanthoxylum*, have, it is said, uniovulate carpels, succeeded by monospermous drupes, and its compound pinnate leaves have no glandular punctures. *Comeurya*, incompletely known, has the same pinnate leaves; but the floral receptacle is cupuliform, and the androceum diplostemonous.

Three small Mexican genera, *Decatropis*, *Polyaster* and *Megastigma*, form also a separate subseries, in which the flowers are always hermaphrodite, small, diplostemonous, and the leaves imparipinnate. In the two former the carpels are free, and the same in number as the petals, while those of *Megastigma* are united among themselves in an ovary with two or three cells, surmounted by a style with large stigmatiferous dilatation. *Decatropis* has ascending ovules, exterior micropyle, and carpels bicarinate upon the sides. In *Polyaster* the ovaries are oblong, without bracts, and the descending ovules have a superior and exterior micropyle.

In the subseries *Pilocarpeæ*, *Pilocarpus* has alternate, opposite, or verticillate leaves, 1–3-foliolate or imparipinnate, and flowers in racemes or spikes, isostemonous, with valvate or slightly imbricated corolla, and an ovary with several cells, the backs prolonged into more or less prominent lobes. *Esenbeckia* is distinguished by its free carpels more or less covered with tubercles and its flowers disposed in racemes or cymes. *Helietta* has the same gynæceum as *Pilocarpus*, with two or three cells becoming at maturity as many distinct samaras. *Lunasia* has also an ovary with three cells prolonged above into a dorsal wing. The fruit is capsular, and all the verticils of the flowers are generally trimerous. In *Hortia*, whose place in this subseries is a little doubtful, the pentamerous flowers are nearly those of *Esenbeckia*; the leaves are simple or trifoliolate; the calyx cupuliform, five-dentate, the petals valvate; and the fruit is a five-celled berry, containing seeds with albuminous embryo.

Acronychia has, like *Hortia*, a single ovary containing four biovulate cells. The petals are valvate, the androceum diplostemonous, the leaves opposite or alternate, unifoliolate, rarely trifoliolate. *Halfordia*,

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form petals, isostemonous perigynous androceum and 4–5-lobed ovary, digitate leaves 5–10-folioled. The latter has with tetramerous flowers an imbricated perianth with very unequal leaves, numerous hypogynous stamens and free carpels, eight in number. The leaves are alternate and trifoliolate.

an Oceanian species very nearly connected with *Aeronychia*, is distinguished from it by its simple leaves, pentamerous flowers, and uniovulate ovary cells.

Skimmia, consisting of Asiatic shrubs, with alternate simple leaves, have polygamous-dicœcious flowers with four or five imbricated petals, an isostemonous androceum, a 2–5-celled ovary, one ovule in each cell, and a drupaceous fruit, the stones each containing an albuminous seed, with one or several embryoes. *Casimiroa* consisting of Mexican trees with an analogous floral formation, have for fruit a large pomiform drupe, with monospermous stones but exalbuminous seeds and the alternate leaves are compound-digitate. *Phellodendron*, of which only one species is known, a native of Manchouria, also has isostemonous flowers, but 5–8-merous polydicœcious pisiform glandular drupes, with five monospermous stones and opposite imparipinnate leaves.

Ptelea trifoliata.

Fig. 445.
Flower ($\frac{3}{1}$).

Fig. 446.
Long. sect. of female flower.

Pitavia nearly approaches the Zanthoxylons proper, and the Quassias (*Simarubeæ*). In *Pitavia*, all the species being natives of America, the flowers are unisexual, tetramerous, with imbricated corolla, eight stamens, and independent ovaries, each supporting a gland above and without. The fruits are drupaceous and indehiscent, and the leaves opposite or ternate. In the Pentaceras of Australia analogous to *Pitavia* by their independent ovaries, surmounted by a gland, the pentamerous diplostemonous flowers are also constituted like those of numerous *Simarubeæ*: but the fruits are samaras, and the alternate leaves imparipinnate.

Ptelea (figs. 445, 446), often connected with *Terebinthaceæ*, constitutes alone a subseries very remarkable by the organization of the fruit. The flowers are polygamo-dicœcious, 4–5-merous, isostemonous, with a single ovary, and two or three biovulate cells. The fruit is a widely-winged veined samara, with two or

three monospermous cells, and the alternate or opposite leaves are compound 3–5-foliolate.

Toddalia, belonging to the warm regions of the Old World, has sometimes been considered as the type of a special tribe of this family, because its carpels are united into one single plurilocular ovary; but after what we have seen, this character does not allow us to place them in any other series but that of *Zanthoxylon,* whose general organization they have with unisexual 2–5-merous flowers, imbricated or valvate petals, an isostemonous androceum, uniovulate cells, coriaceous or fleshy fruit, an embryo surrounded by a fleshy albumen and alternate trifoliolate leaves, covered with glandular punctures.

VI. AMYRIS SERIES.

The flowers of *Amyris*[1] (figs. 447–451) are hermaphrodite or polygamous, with convex receptacle. The calyx is gamosepalous, with four teeth, imbricated when young. The corolla is formed of four alternate imbricated petals expanded at anthesis. The stamens are eight in number, superposed, four to the divisions of the calyx, and four shorter to the petals. Each of them is formed of a free hypogynous exserted filament, and a two-celled introrse anther dehiscing by two longitudinal clefts. The gynæceum, sterile and rudimentary in the male flower, is accompanied at its base by a disk more or less thick in the female or hermaphrodite flowers, when it is composed of a single one-celled carpel,[2] surmounted by a style short or almost wanting, more or less dilated, and covered above with stigmatic papillæ. Upon the wall of the ovary cell a placenta is seen supporting two collateral descending ovules, with superior and exterior micropyle.[3] The fruit is a globose or elongated drupe,[4] accompanied at its base by the persistent calyx. The thin chartaceous stone generally contains one seed, the coats covering a fleshy albumen with plano-convex cotyledons and short superior radicle.

[1] L., *Gen.,* n. 473 (part.).—J., *Gen.,* 371.—Lamk., *Dict.,* i. 359 (part.).—K., in *Ann. Sc. Nat.,* sér. 1, ii. 364.—DC., *Prodr.,* ii. 81 (part.).—Turp., in *Dict. Sc. Nat.,* Atl., t. 266.—Spach, *Suit. à Buffon,* ii. 231.—Endl., *Gen.,* n. 5947.—B. H., *Gen.,* 327, 993, n. 17.—H. Bn., in *Adansonia,* x. 319.—*Elemifera* Plum. (ed. Burm.), iv. 87.—*Lucinium* Pluk., *Almag.,* t. 201, fig. 3.—*Toxicodendron* Mill., *Dict.,* n. 9 (nec Thunb.).

[2] Which appears superposed to a petal.

[3] With double coat.

[4] Scanty, odoriferous, oily, often covered with glandular punctures.

Amyris consists of trees and shrubs, of which every part, even to the embryo, is covered with glandular punctures secreting a resinous odorous liquid. The leaves are alternate, or here and there opposite or imparipinnate, more usually 1–3-foliolate, with opposite articulate

Amyris maritima.

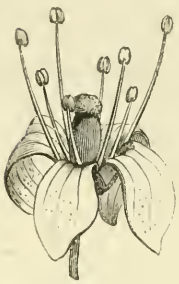


Fig. 448.
Hermaphrodite flower ($\frac{2}{1}$).

Fig. 447.
Floriferous branch.

Fig. 449.
Long. sect. of flower.

Fig. 450.
Fruit ($\frac{3}{1}$).

Fig. 451.
Long. sect. of fruit.

folioles. The petiole, exstipulate at the base, is sometimes marginate, as is the rachis. The flowers are grouped in the axils of the leaves or at the summit of the branches in ramified racemes of cymes. The genus contains some ten species,[1] native of the Antilles and the neighbouring regions of the two Americas.

Beside *Amyris* we doubtfully place two genera having the same organization of the gynæceum, the fruit, and the seed. These are: *Stauranthus*, consisting of Mexican shrubs, having hermaphrodite, isostemonous flowers, a uniovulate ovary, a berry as fruit, and unifoliolate leaves; and *Teclea*, having diœcious, sessile flowers, four

[1] Jacq., *Amer.*, 107.—H. B. K., *Nov. Gen. et Spec.*, vii. 37, t. 610.—Torr. & Gr., *Fl. N.-Amer.*, i. 221.—Griseb., *Fl. Brit. W.-Ind.*, i. 174.—Turcz., in *Bull. Mosc.* (1858), i. 475.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 5, xiv. 321.—Karst., *Fl. Colomb.*, t. 158.—Walp., *Rep.*, i. 560; ii. 831; v. 420; *Ann.*, vii. 552.

or five parted isostemonous biovulate ovary and drupaceous fruit. The leaves are alternate, compound-digitate, with one, two, or three folioles. They are consequently very nearly allied to *Amyris*, but present also close affinities with *Toddalia*.

VII. AURANTEA SERIES (Fr., *Orangers*).

The Orange-tree (*Citrus Aurantium*) has given the French name to this small group, but it presents a degree of complication in its floral organization that does not permit of it being taken as the type. We prefer to study as such a genus like *Limonia*[1] (figs. 452–454), the flowers of which are regular and hermaphrodite, with convex receptacle. The calyx has five sepals free or united to a variable distance, and disposed in the bud in quincuncial præfloration. The corolla is formed of five alternate petals, imbricated in the bud. The stamens are ten in number, superposed, five to the divisions of the calyx, and five, shorter, to the petals. The filaments are inserted under a circular hypogynous disk, free, subulate, or more or less dilated below, and their anthers are two-celled, introrse, dehiscing by two longitudinal clefts. The gynæceum is free, superior, formed of an ovary with five (more rarely of two, three or four) oppositipetalous cells, surrounded by a style swollen at the apex into a stigmatiferous head, often articulated upon the ovary at the base, from which it is sooner or later detached. In the internal angle of each cell a placenta is seen supporting one or two descending ovules, collateral or superposed, with micropyle directed upwards and outwards. The fruit is a plurilocular berry, one or several

Limonia (*Glycosmis*) *cochinchinensis.*

FIG. 452. Flower (♀).

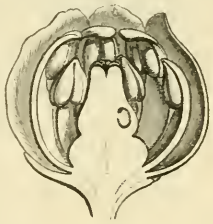


FIG. 453. Long. sect. of flower.

[1] L., *Gen.*, n. 534.—J., *Gen.*, 261.—LAMK., *Dict.*, iii. 516 (part.); Suppl., iii. 440; *Ill.*, t. 353.—DC., *Prodr.*, i. 535.—SPACH, *Suit. à Buffon*, ii. 251.—ENDL., *Gen.*, n. 5501.—H. BN., *Aurant.* (*De la Fam. des Aurantiacées* (1855), thès. Fac. méd. Par.), 19, 33.—OLIV., in *Journ. Linn. Soc.*, v. Suppl., 14, 27.—B. H., *Gen.*, 303, n. 75.—*Winterlia* DENNST., *Hort. Malab.*, ii. 9 (ex ENDL.).—*Hesperethusa* RŒM., *Syn.* (ex OLIV., *loc. cit.*).—(Incl.: *Glycosmis* CORR., *Triphasia* LOUR.).

cells of which contain one or two seeds. These have under their coats a fleshy embryo, with superior exalbuminous radicle. *Limonia* consists of fragrant shrubs of tropical Asia, the organs of which are covered with pellucid[1] glandular points, prominent or depressed. The twigs are often transformed into spines. The alternate exstipulate leaves are trifoliolate or imparipinnate.

We have attached as a section to the genus *Limonia*, *Glycosmis*,[2] only essentially differing from it by one character: the ovary, generally with uniovulate cells, is not articulated, but continuous with the base of the style.

L. trifoliata[3] (fig. 454), a small thorny Chinese shrub, has also been generically distinguished under the name of *Triphasia*;[4] that also we can only preserve as a section. Thus limited, the genus contains six or seven species.[5]

Limonia (*Triphasia*) *trifoliata*.

Fig. 454. Long. sect. of flower ($\frac{2}{1}$).

Beside *Limonia* are placed a certain number of other very nearly allied genera, of which several have been perhaps uselessly detached from it. These are: *Murraya*, whose pentamerous flowers have a quinquefid or quinquepartite calyx, ten stamens with linear subulate filaments, ovary cells one- or two-ovulate, and whose unarmed branches bear pinnate leaves and flowers disposed in terminal cymes; *Micromelum*, which, with the same leaves and inflorescence, have pentamerous flowers, a five-lobed or entire calyx, petals valvate or nearly so, ten stamens, two superposed ovules in each cell, and an embryo remarkable for its contortuplicate cotyledons; *Clausena*, having also pinnate leaves, and whose flowers, disposed in simple or compound ramified racemes, are 3–5-merous, with a lobed or partite calyx, petals imbricated or subvalvate, diplostemonous androceum, staminal

[1] Reservoirs of a very fragrant oil generally essential.

[2] Corr., in *Ann. Mus.*, vi. 384. — DC., *Prodr.*, i. 538. — Endl., *Gen.*, n. 5502. — H. Bn., *Aurant.*, 13, 31; in *Adansonia*, x. 319.—Oliv., in *Journ. Linn. Soc.*, v. Suppl., 17, 36.—B. H., *Gen.*, 303, n. 71.—*Toluifera* Lour., *Fl. Cochinch.* (ex H. Bn., in *Adansonia*, x. 319).—*Myxospermum* Rœm., *Syn.*, 40. — ? *Dioxippe* Rœm., *loc. cit.*—*Chionotria* Jack, *Mal. Misc.* (ex *Hook. Comp. to Bot. Mag.*, i. 155).

[3] L., *Mantiss.*, 237.—Burm., *Fl. Ind.*, t. 35, fig. i.—Jacq., *Ic. Rar.*, t. 463.—Andr., *Bot. Repos.*, t. 143.

[4] Lour., *Fl. Cochinch.*, 152.—DC., *Prodr.*, i. 535.—Endl., *Gen.*, n. 5500.—H. Bn., *Aurant.*, 14, 30; in *Bull. Soc. Bot. de Fr.*, v. 152; in *Adansonia*, x. 319.—Oliv., in *Journ. Linn. Soc.*, v. Suppl., 13.

[5] Rheede, *Hort. Malab.*, iv. t. 14.—Roxb., *Pl. Coromand.*, i. t. 84, 85–87. — Wight & Arn., *Prodr.*, i. 91, 92.—Wight, *Ill.*, t. 41.—Miq., *Fl. Ind.-Bat.*, Suppl. i. 500.—Thw., *Enum. Pl. Zeyl.*, 45, 405.—Walp., *Ann.*, vii. 532 (*Glycosmis*), 533.

filaments dilated below, and two ovules in each cell; *Luvunga*, consisting of unarmed or thorny shrubs, with cupuliform calyx, and stamens often monadelphous at the base, with anthers always linear. The leaves are trifoliolate and punctuate, and the inflorescence axillary.

In *Atalantia* and *Paramygnia*, composed of unarmed or thorny shrubs, the leaves are constantly unifoliolate. The flowers, axillary, constructed on the same plan as the preceding genera, have in the former a calyx 3–5-lobed, or unequally cloven, from six to ten stamens, free or connate, with oval or cordate anthers, a cupuliform disk, and uni- or biovulate cells. In *Paramygnia*, the calyx is entire or lobed, the stamens, eight to ten in number, have oblong-linear anthers, and the disk-bearing receptacle takes the form of an elevated thick column.

Feronia belongs to a distinct subseries, which might be named *Citreæ*, because the genus *Citrus* is the principal one contained in it. In *Feronia* the receptacle and perianth are analogous to those of *Limonia*, with two verticils of stamens, double in number, or nearly so, to the petals, and inserted under the hypogynous disk. The ovary, with about as many cells as there are petals, to which they are superposed. But in the internal angle of the cells, which are often incomplete, an indefinite number of anatropous ovules are observed, arranged in two vertical series, more or less descending, with micropyle directed upwards and outwards. The fruit is a globular berry, with ligneous rind, filled with pulp in which the seeds are lodged. *Ægle* has all the characters of *Feronia*, and especially the multiovulate cells. But the number of these is indefinite, as is the case also with the stamens. The fruit is also a corticate pulpous berry. The leaves are trifoliolate, while those of *Feronia* are imparipinnate.

Nothing is easier to define than the genus *Citrus*[1] (figs. 455–459) when the preceding genera are known. It may be said that it

[1] L., *Gen.*, n. 1218; *Hort. Cliff.*, 379; *Hort. Ups.*, 236.—J., *Gen.*, 261.—Poir., *Dict.*, iv. 575; Suppl., iv. 171.—Lamk., *Ill.*, t. 639.—DC., *Prodr.*, i. 539.—Turp., in *Dict. Sc. Nat.*, Atl., t. 159.—Spach, *Suit. à Buffon*, ii. 256.—Endl., *Gen.*, n. 5514.—Payer, *Organog.*, 113, t. 25.—H. Bn., *Aurantiac.*, 16, 36.—Oliv., in *Journ. Linn. Soc.*, v. Suppl., 23.—B. H., *Gen.*, 305, 992, n. 81.—Schnizl., *Iconogr.*, t. 224.—Lem. & Done., *Tr. Gen.*, 317.—*Aurantium* T., *Inst.*, 620, t. 393, 394.—*Citreum* T., *loc. cit.*, t. 395, 396.—*Limon* T., *loc. cit.*, 621, t. 397.—*Sarcodactylis* Gærtn. f., *Fruct.*, iii. 39, t. 185.—*Papeda* Hassk., *Hort. Bog.*, 216.—*Pseudægle* Miq., in *Ann. Mus. Lugd.-Bat.*, ii. 83.—? *Oxanthera* Montrous., in *Mém. Acad. Lyon*, x. 186 (ex B. H., *loc. cit.*).

consists of species of *Feronia*, with numerous polyadelphous stamens united round the hypogynous disk in very unequal bundles (of which some may even be reduced to one stamen), and with ovary cells multiovulate and indefinite in number; or we might describe it as consisting of a species of *Ægle*, whose stamens, inserted round a circular disk instead of being free, are united into a variable number of unequal bundles.[1] The cupuliform calyx has five teeth

Citrus Aurantium.

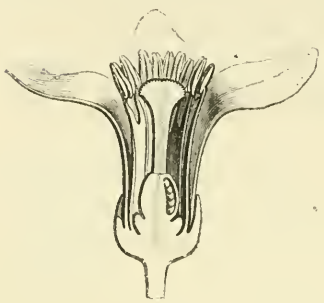


Fig. 455.
Long. sect. of flower ($\frac{3}{2}$).

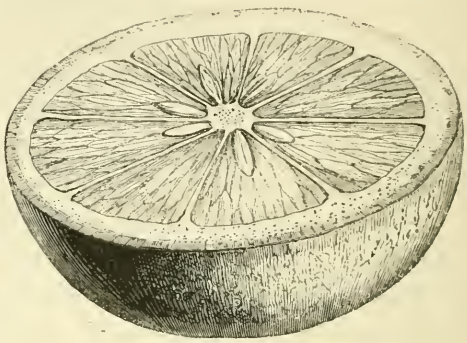


Fig. 456.
Transverse section of fruit.

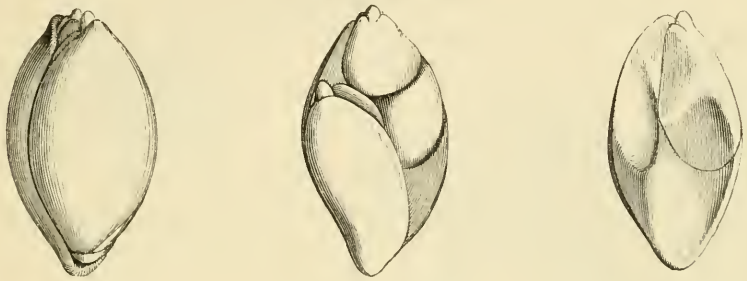
(or a variable number, from four to six), and generally five imbricated petals; but the number of the latter may also vary from four to eight, or more. The fruit is a berry, of which oranges and lemons furnish a familiar example, and easily show the organization. The wall is not thick, although composed of three different layers; but the numerous cells contain, besides a variable number of seeds, a soft pulp, more or less acid or sweet, formed by hairs and elongated cells, secreting a juice abounding in their cavity, and which, springing from the surface of the endocarp, advance into the cells, which they obstruct, and whose seeds they definitely envelope.[2] These

[1] In *Papeda* and *Pseudægle* the bundles of stamens are more or less indicated; but the filaments are free, or nearly so; they may be made sections of the genus *Citrus*. The pollen of the *Aurantiaceæ*, studied by H. Mohl (in *Ann. Sc. Nat.*, sér. 2, iii. 330) is "ovoid; three folds; in water spherical with three papillose bands."

[2] These cells are formed by the hairs of the internal surface of the pericarp. At the opening of the flower the interior epidermis of the ovary already presents small prominent teats; these are accrescent cells enlarging towards the middle of the wall. Others increase in the same way to the right and left of the first as far as the partition. They do not rise thus upon the entire partition as far as the placentas; the phenomenon usually stops very far from the internal angle. Later, these cells whose summit is advanced towards the placentary angle becomes acute at the apex, large towards the middle of their length, and then more or less pediculate; after which they are compressed one by the other, and their surface then presents

contain under their coats one or several fleshy embryoes, with cotyledons often unequal and irregular, and short superior radicle (figs. 457–459). More than thirty species of this genus have been described; these are probably forms or varieties of four or five species,[1] natives of the tropical regions of Asia. They are aromatic[2] trees or

Citrus Aurantium.



Figs. 457, 458, 459.
Embryos ($\frac{4}{1}$).

shrubs, with branches often thorny, leaves persistent, alternate only having one articulate foliole and a more or less dilated and winged petiole.[3] The fragrant flowers are axillary and solitary, accompanied by sterile bracts, or disposed in few-flowered cymes with centrifugal evolution.

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unequal faces. Their contents become modified; in the interior is secreted the acid and sweet juice of oranges, lemons, &c. (Upon the formation of this complementary layer of the fruit see Targioni, in *Giorn. Tosc. d. Sc.*, i. 575.—Zucc., in *Abh. d. Bay. Akad.*, iv. p. i. 159; p. ii. 33, t. 66.—H. Bn., *Aurantiac.*, 42.—Car., *Sull. Polp. che Invogl. i Semi* (Firenz., 1864), 7, t. 1.

[1] Monard., *De Citr. Aurant. et Lim.* (Antwerp., 1561).—Ferrar., *Hesperid.* (Roma, 1646).—Galles., *Tr. du Citrus* (Par., 1811). *D. Giard. di Firenze* (1839); *Gli Agrum.*—Risso & Poit., *Hist. Nat. des Orang.* (Par., 1818-19).—Rœm., *Syn. Hesperid.* (For the principal treatises on the genus, see Pritzel, *Thes.*, 444, 451.)—Wight & Arn., *Prodr.*, i. 97.—Sieb. & Zucc., *Fl. Jap.*, t. 15.—Griseb., *Fl. Brit. W.-Ind.*, 132.—Benth., *Fl. Austral.*, i. 371.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 530.—Walp., *Rep.*, i. 382; ii. 504; v. 140; *Ann.*, vii. 535.

[2] This is due to the numerous more or less prominent vesicles full of an essential oil scattered through most of the organs, leaves, flowers, pericarp, &c. We observed in 1855 that these reservoirs are formed first of a certain number of secretive cells constituting a yellowish mass embedded in the ambient tissues, and that later a large channel is produced at this level which crosses and forms a large lacuna, carpeted with the remains of fine compressed cells. Martinet, who has studied the development of these glands (in *Ann. Sc. Nat.*, sér. 5, xiv. 199), does not admit this opinion; but it is easy to see that what he substitutes for it only differs in the mode of statement and the interpretation of facts.

[3] Equal in size to the limb itself in certain species of *Citrus*, especially *C. Hystrix* DC. (*Cat. Hort. Monsp.*, 97; *Prodr.*, n. 7). In *Pseudægle* the leaves are trifoliolate.

VIII. BALANITES SERIES.

In this small group, formed of the single genus *Balanites*[1] (figs. 460–463), the flowers are regular and hermaphrodite, with a surbased receptacle. The calyx is formed of five sepals, disposed in

Balanites ægyptiaca.

Fig. 460.
Floriferous branch.

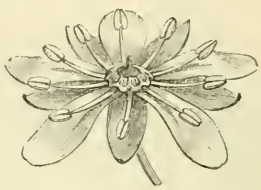

Fig. 461.
Flower ($\frac{4}{1}$).

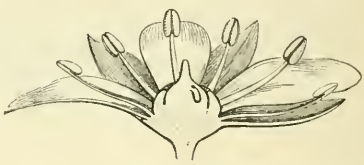

Fig. 462.
Long. sect. of flower.

the bud in quincuncial præfloration ;[2] and the corolla, of five alternate petals, imbricated when young.[3] The stamens are ten in number, five longer alternate, and five superposed to the petals ; they are formed of a two-celled introrse anther, dehiscing by two longitudinal clefts attached at the back to a free subulate filament. This is inserted in one of the ten inferior hollows of the hypogynous disk in the form of a thick festoon.[4] The gynæceum is superior; it is composed of an ovary with five oppositipetalous cells, surmounted by a conical style with stigmatiferous apex divided into five small lobes, often but little distinct. In the

Balanites ægyptiaca.

Fig. 463.
Dry fruit.

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[1] Del., *Fl. d'Eg.*, n. 77, t. 28, fig. 1.—DC., *Prodr.*, i. 708.—Arn., in *Ann. Sc. Nat.*, sér. 2, iii. 246.—Endl., *Gen.*, n. 5498.—B. H., *Gen.*, 314, n. 26.—H. Bn., in *Adansonia*, ii. 381, t. 10, fig. 9, 10 ; x. 316.

[2] Their edges, levelled as it were, are however not very large.

[3] Glabrous or velvety, especially outwardly, entire, or hollowed at apex.

[4] It has ten prominent lobes above, and ten others alternate, prominent below ; it is in the sinuosities separating these latter from each other at the bottom of an equal number of small pits that the stamens are inserted.

internal angle of each cell is inserted a descending anatropous ovule, with superior and exterior micropyle. The fruit is a drupe, with smooth, fragile epicarp, and fleshy, oily mesocarp traversed by bundles of vascular fibres, with pentagonal hard, bony,[1] monospermous stone. The descending seed contains under its coats a thick exalbuminous embryo, with plano-convex cotyledons, sometimes unequal, bilobed or corrugate, and a short superior radicle. The two *Balanites* known[2] are shrubs[3] from the warm regions of Africa and South Western Asia. Their branches bear abortive twigs transformed into spines (fig. 460), and alternate leaves, with two folioles, entire, coriaceous, not punctuate, articulate, accompanied by two small lateral stipules. The flowers[4] are united in cymes occupying the axil of the leaves, or that of bracts arranged in gradation on a common axis; the pedicels are articulate at the base.

IX. QUASSIA SERIES.

The genus *Quassia*[5] has long been reduced to one celebrated species *Q. amara* (figs. 464–467). It is a small tree, with hermaphrodite flowers, whose convex receptacle has the shape of a reversed cone. On a level with its small base (which is inferior) five sepals are inserted quincuncially imbricated in the bud, and five petals, alternate with them, much longer, contorted in præfloration, generally together as in a tube even at anthesis (fig. 465), more rarely expanded or remote. Ten stamens, disposed in two verticils, are inserted on the same level as the perianth, superposed, five to the sepals, and five shorter to the petals. Each is formed of a slender filament, furnished within the base with a velvety scale, and a two-

[1] Upon the transverse section is seen a very elegant plexus, contrasting by its paleness with the deep fawn colour of the endocarp.

[2] L., *Spec.*, 1194 (*Ximenia*).—R. Br., *Misc. Works* (ed. Benn.), i. 44, 287.—Guillem. & Perr., *Fl. Sen. Tent.*, i. 103.—Pl., in *Ann. Sc. Nat.*, sér. 4, ii. 258.—Oliv., *Fl. Trop. Afr.*, i. 314.—Trevir., in *Bot. Zeit.* (1857), 65.—Walp., *Rep.*, i. 379; *Ann.*, i. 126; iv. 354; vii. 542.

[3] With bark bitter like the sarcocarp.

[4] Small greenish or whitish pubescent, with grateful odour.

[5] L., *Gen.*, n. 521 (part.).—J., *Gen.*, 282.—Lamk., *Ill.*, t. 343, fig. 1.—Poir., *Dict.*, vi. 23; Suppl., iv. 636 (part.).—DC., in *Ann. Mus.*, xvii. 323; *Prodr.*, i. 733.—A. Juss., in *Mém. Mus.*, xii. 513, t. 25, fig. 43.—Turp., in *Dict. Sc. Nat.*, Atl., t. 125.—Spach, *Suit. à Buffon*, ii. 373.—Endl., *Gen.*, n. 5962.—B. H., *Gen.*, 308, 992, n. 1.—Ag., *Theor. Syst.*, t. 19, fig. 2.—H. Bn., in *Adansonia*, xi. fasc. 1 (incl.: *Aruba* Aubl., *Homalolepis* Turcz., *Phyllostema* Neck., *Simaba* Aubl., *Zwingera* Schreb.).

celled, introrse, oscillating anther dehiscing by two longitudinal clefts.[1] The gynæceum is placed above upon the large base of the trunk of the receptacular cone; it is composed of five oppositipetalous carpels, each formed of a one-celled ovary, tapering above

Quassia amara.

FIG. 467.
Fruit.

FIG. 465.
Flower.

FIG. 464.
Floriferous branch ($\frac{1}{3}$).

FIG. 466.
Flower without corolla and stamens ($\frac{2}{1}$).

into a long, slender style, which unites with the other style, and is twisted with them to form a long subulate column, with stigmatiferous apex, not dilated. In the internal angle of each is a placenta supporting a descending anatropous ovule, with superior and exterior micropyle.[2] The fruit is formed of five drupes (or a less number),

[1] H. MOHL (in *Ann. Sc. Nat.*, sér. 2, iii. 339) describes the pollen as "ovoid, three grooves; in water, ovoid with three narrow bands and very small papillæ. *Simaba bicolor* ZUCC., *Quassia amora* (without papillæ ?)."

[2] It has two coats. The first is very thick; the second, atropous, forms beyond the nucleus a small cylindrical neck.

with a not very thick mesocarp,[1] and hard stone, containing a small descending seed, the coats[2] of which envelop a fleshy exalbuminous embryo, with thick plano-convex[3] cotyledons, and short cubical radicle.[4] *Q. amara* is a native of tropical America. It owes its specific name to the fact that all its parts are very decidedly and intensely bitter. The leaves are alternate, imparipinnate, glabrous, not punctuate, exstipulate, with a petiole and rachis developed on each side into wings in the interval of the leaves, which are opposite, entire, and articulate. The flowers[5] are disposed in terminal racemes, simple, or more rarely ramified; each is situated in the axil of a bract, and its articulate pedicel bears two lateral bractlets.

Quassia (*Aruba*) *Cedron.*

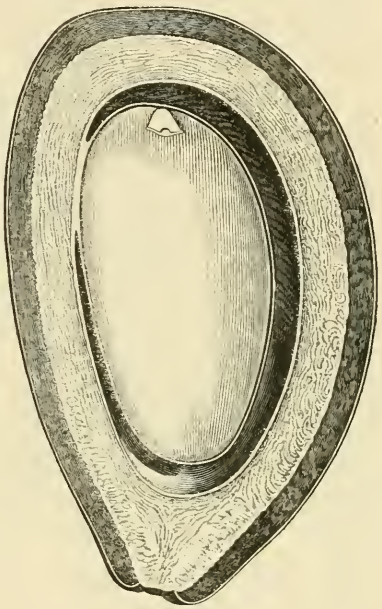

FIG. 468.
Long. sect. of drupe.

In a second species of this genus,[6] recently discovered in tropical Western Africa, the leaves have a scarcely winged rachis; and the flowers, of a greenish yellow, have petals always expanded at anthesis, while the surface of the receptacle comprised between the androceum and the gynæceum takes the form of the trunk of a reversed pyramid, because the ten scales accompanying the staminal filaments impress ten corresponding faces upon the sides.

In a certain number of American species, of which the genus *Aruba*[7] has been made, the receptacular faces exist, as do also the

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[1] The internal angle presents a vertical awn, towards the summit of which is seen the cicatrice of the style. Below is found the cicatrice of the insertion of the carpel, a sort of tear extending deeply as far as the endocarp.

[2] There are two, thin but distinct, although adhering to each other.

[3] They are equal and lateral, or more rarely unequal, one being within, and in this case smaller than the other.

[4] It has a truncate summit which scarcely extends beyond the surface of the cotyledons, and which appears as though encased in the base of the latter. A few small whole leaves may be distinguished in the gemmule.

[5] Of a beautiful bright red.

[6] *Q. africana* H. BN., in *Adansonia*, viii. 89, t. 8.—OLIV., *Fl. Trop. Afr.*, i. 312.—*Simaba Africana* H. BN., in *Adansonia*, vii. 381.

[7] AUBL., *Guian.*, i. 293, t. 115.—H. BN., in *Adansonia*, x. 317.—*Simaba* AUBL., *Guian.*, i. 400, t. 153.—DC., *Prodr.*, i. 733.—A. S. H., in *Bull. Soc. Philom.* (1823), 129.—A. JUSS., in *Mém. Mus.*, xii. 515, fig. 45.—SPACH, *Suit. à Buffon*, ii. 376.—ENDL., *Gen.*, n. 3964.—

separation of the petals after anthesis; these are generally shorter, and the flower is sometimes only tetramerous. These characters do not permit *Aruba* to be generically separated from *Quassia*.[1] They have the same fruit, but sometimes of the largest dimensions, as is seen in the drupes of *Q. cedron* (fig. 468). The leaves are alternate, compound-pinnate, sometimes trifoliolate; the flowers are collected in racemes, rarely simple, but oftener ramified and composed of cymes. Some fifteen of them are known.[2]

Very nearly related to *Quassia* by the section *Aruba*, *Simaruba* is only essentially distinguished from it by its dicœcious or polygamous flowers, hemispherical receptacle more or less velvety, and its imparipinnate leaves, with opposite folioles. We must consider as very nearly allied genera: *Hannoa*, of tropical Africa, which has polygamous flowers, with subbilabiate quinquefid calyx, an elongated floral receptacle with ten grooves, and a fruit formed of five or six scarcely fleshy drupes; *Samandura*, distinguished by its 3–5-merous, hermaphrodite flowers, a calyx glandular at the base, and simple, alternate leaves, biglandular at the base; *Mannia*, whose pentamerous, hermaphrodite flower has a five-lobed receptacle, and from fifteen to twenty stamens, with pinnate leaves; *Hyptiandra*, an Australian shrub, whose 4–5-merous flowers, solitary, or few in number, in the axils of the simple, entire leaves, with a diplostemonous androceum, without scaly appendages to the filaments, and coriaceous fruits, with seeds slightly albuminous; *Castela*, consisting of small American shrubs, often thorny, with simple, alternate leaves, flowers grouped in small axillary cymes, polygamo-dicœcious, tetramerous, with fleshy 8-lobed receptacle, four styles with free revolute summits, and four drupes with crustaceous stone; *Holacantha*, a thorny, aphyllous shrub (imperfectly known) of New Mexico, whose dicœcious flowers are 7–8-merous, and the fruit formed of a variable number of drupes, with but slightly albuminous seeds.

Ailantus (figs. 469–471), with polygamous, pentamerous flowers, whose organization is nearly the same as those of *Simaruba*, is clearly

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B. H., *Gen.* 308, n. 2. — *Zwingera* Schreb., *Gen.*, ii. 802. — *Phyllostema* Neck., *Elem.*, n. 1075. — *Homalolepis* Turcz., in *Bull. Mosc.* (1848), ii. 575.

[1] See upon this question *Adansonia*, viii. 88.

[2] A. S. H., *Pl. Rem. Brés.*, 126, t. 10, 11; *Fl. Bras. Mer.*, i. 71, t. 14 (*Simaba*). — H. B. K., *Nov. Gen. et Spec.*, vi. 18, t. 514. — Hook., *Kew Journ.*, ii. t. 11 (*Simaba*). — Griseb., *Fl. Brit. W.-Ind.*, 139 (*Simaba*). — Tr., in *Ann. Sc. Nat.*, sér. 5, xv. 357 (*Simaba*). — *Bot. Mag.*, t. 497. — Walp., *Ann.*, i. 161, 162; iv. 420; vii. 737 (*Simaba*).

distinguished by its fruit, formed of carpels the pericarp of which dilates in membranous samaras (fig. 471). It consists of trees from

Ailantus glandulosa.

FIG. 469.
Floriferous branch ($\frac{1}{30}$).

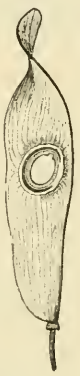

FIG. 471.
Long. sect. of carpel.

temperate Asia and Australia, with alternate imparipinnate (fig. 469) fetid leaves, not bitter. The small and greenish flowers are disposed in terminal ramified cymes.[1]

Ailantus glandulosa.

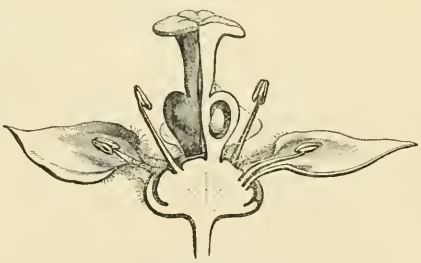

FIG. 470.
Long. sect. of hermaphrodite flower ($\frac{4}{1}$).

In other genera also, very analogous to the preceding, the androceum is isostemonous. Such are: *Picræna* (fig. 472), bitter trees of tropical America, with imparipinnate leaves, and 4–5-merous polygamous flowers, the petals but little developed, subvalvate, the stamens destitute of scale appendages, and the fruit formed of one, two, or three drupes, constructed like those of *Quassia* proper. *Picrasma*, consisting of Asiatic trees, with imparipinnate leaves, very nearly allied

[1] *Rigiostachys squamata* (PL., in *Hook. Lond. Journ.*, vi. 29;—B. H., *Gen.*, 309, n. 7;—WALP., *Ann.*, i. 202), which is perhaps, *Recchia* (MOÇ. & SESS., in *DC. Syst.*, i. 411) but which does not exist in the herbarium of MOÇINNO, at Madrid, has been placed beside *Ailanthus* and *Samandura*, after having been connected with *Connaraceæ* and *Surianeæ*. It appears to us "probable that *Rigiostachys* is a *Rosaceæ*, an abnormal *Rosaceæ* it is true, because of the shallowness of its receptacular cup, and the disposition of its inflorescence." Its flowers have a small cupuliform receptacle, but little concave, lined by a disk, with twenty crena-

to *Picræna* and *Simaruba*, but characterized by a thick disk, stamens covered with hairs, and albuminous seeds, while *Picræna* has a 3–5-lobed disk, stamens naked and glabrous, petals non-accrescent after anthesis, and exalbuminous seeds like those of *Quassia*. *Picrolemma*,

Picræna excelsa.

Fig. 472.
Female floriferous branch ($\frac{1}{5}$).

a small Brazilian shrub, with imparipinnate leaves, tetramerous, dicœcious flowers, with four imbricated petals, the same number of superposed stamens, and a disk thick and elevated in the female flowers, wanting in the male. *Brucea* (fig. 473), whose tetramerous,

tures alternately prominent within and without, five sepals, imbricated petals, two verticils of five stamens, with introrse slightly oscillating anthers. At the bottom of the receptacle are two free carpels with obconical support, upon which is articulated a one-celled ovary with almost gynobasic style. On the internal wall of the ovary two collateral-descendent anatropous ovules are inserted with superior exterior micropyle capped by an obturator. *Rigiostachys*, whose fruit is unknown, is a Mexican tree (?) with alternate, stipulate, imparipinnate leaves, not bitter, and very numerous flowers united into a large ramified raceme, the tertiary divisions of which bear alternate bracts and pedicellate articulate flowers, accompanied by two lateral bractlets. (See *Adansonia*, x. 42).

polygamous flowers, disposed in long racemes of non-ramified cymes, have an imbricated calyx, and four small imbricated petals, stamens without scales, drupes with rugose stones. They inhabit tropical Africa and Asia. *Eurycoma*, consisting of Malaysian trees, whose polygamous flowers, disposed in large ramified cymes, have no disk, and whose corolla is involute in the male flower, smaller and valvate induplicate in the female or hermaphrodite flower, the styles being united among themselves to a variable distance, while they are free in *Brucea*. The fruit is nearly that of *Quassia*.

Brucea antidysenterica.

Fig. 473.
Male flower ($\frac{4}{1}$).

Picrella (figs. 474–477), a Mexican plant, whose bitterness is most

Picrella trifoliata.

Fig. 474.
Floriferous branch.

Fig. 475.
Flower ($\frac{6}{1}$).

Fig. 476.
Diagram.

Fig. 477.
Long. sect. of flower.

intense in the fresh state, recalls moreover a great many Diosmas and Zanthoxylons by its opposite, trifoliolate, punctuate-glandular leaves, and by its small flowers in cymes; but these flowers, very analogous to those of *Esenbeckia*, are remarkable for their tetramerous type, valvate corolla, isostemonous androceum and carpels with free ovaries surrounded by a disk and each containing an ascendent subbasilar ovule with inferior and interior micropyle.

The ovules are two in number, or still more numerous in the small subseries *Dictyolomeæ*, comprising two isostemonous genera: *Dictyoloma* (figs. 478–483), consisting of American Quassias, with alternate

Dictyoloma incanescens.

Fig. 478.
Flower ($\frac{4}{1}$).

Fig. 480.
Flower, perianth removed.

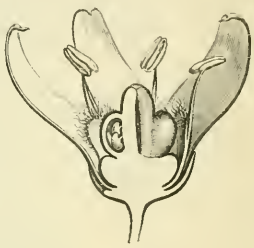

Fig. 479.
Long. sect. of flower.

Fig. 482.
Seed ($\frac{8}{1}$).

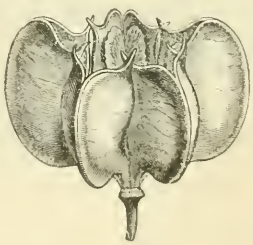

Fig. 481.
Fruit ($\frac{2}{1}$).

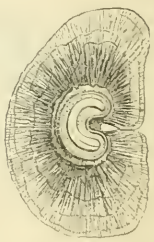

Fig. 483.
Long. sect. of seed.

bipinnate leaves, polygamous flowers, with four or five ovules in each free ovary, and capsular fruits, with seeds surmounted by a circular, membranous, veined wing; and *Cneoridium*, an American shrub, with simple leaves and hermaphrodite, unicarpellary flowers, and two ascending seeds in the ovary; also (?) an Australian diplostemonous genus, *Cadellia*, where the leaves are simple and tasteless, and the free ovaries, from one to five in number, contain in the internal angle from two to four descending ovules.

A certain number of Quassias have been separated as a tribe, under the name of *Picramniceæ*, whose carpels, instead of being independent below, are united into a plurilocular ovary. We remark among these plants *Tariri* (figs. 484, 485), subsequently called *Picramnia*, consisting of American trees or shrubs, very bitter, with alternate, imparipinnate leaves, analogous by these characters to those of most of the true

Tariri (*Picramnia*) *polyantha.*

FIG. 484.
Female flower ($\frac{8}{1}$).

FIG. 485.
Long. sect. of female flower.

Quassias. Their flowers are dicœcious, 3–5-merous, with, or more rarely without, a corolla, and having stamens equal in number to the petals, to which they are superposed. Each of the two or three cells of their ovary contains two collateral descending ovules, with exterior and superior micropyle; their fruit is a mono- or oligospermous berry, with exalbuminous seeds. *Spathelia*, consisting of trees of Western

Harrisonia Brownii.

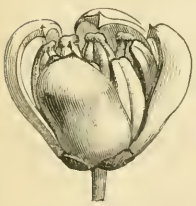

FIG. 486.
Flower ($\frac{3}{1}$).

FIG. 488.
Fruit.

FIG. 490.
Embryo ($\frac{3}{1}$).

FIG. 489.
Transverse sect. of fruit.

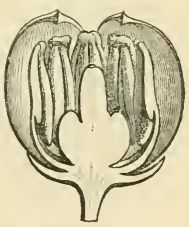

FIG. 487.
Long. sect. of flower.

India, are not bitter, have imparipinnate leaves, and pentamerous, isostemonous flowers, to which succeed triquetrous fruits, with three wings and a hard stone. The embryo is surrounded by a fleshy albumen. *Picrodendron*, a tree from the Antilles, is distinguished by its trifoliolate leaves, the male flowers said to be grouped in catkins, and a drupaceous fruit, whose single seed contains an embryo with folded cotyledons. *Harrisonia* (figs. 486–490), consisting of shrubs

from tropical Asia and Oceania, have the trifoliolate leaves of *Picrodendron*, or compound-pinnate ones; but the flowers are diplostemonous, and the drupaceous fruit contains in each stone a seed with conduplicate cotyledons.

Irvingia, consisting of shrubs (not bitter) from tropical Western Africa (and which may certainly be attributed to this group), has, on the contrary, simple leaves, accompanied by axillary stipules, diplostemonous flowers, whose ovary only contains one descending ovule in each cell, and the drupaceous fruit presents a hard stone, with a single seed, the embryo being sometimes albuminous, sometimes exalbuminous. In *Soulamea* (figs. 491, 492), consisting of very bitter trees from the Moluccas, New Caledonia, and the neighbouring islands, the leaves are simple or compound-pinnate, and the polygamous, trimerous, diplostemonous flowers have a two-celled uniovulate ovary. The coriaceous, indehiscent, compressed fruit, edged by a more or less developed wing, contains one or two seeds, with scanty albumen.

Soulamea amara.

FIG. 491. Fruit.

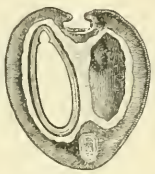

FIG. 492. Long. sect. of fruit.

Amaroria, hitherto incompletely known, seems to represent a lessened type of the preceding genus, as with a floral organization analogous to that of *Soulamea*, it only possesses one unsymmetrical one-celled biovulate ovary, to which succeeds a dry, nut-shaped fruit, whose bony stone contains a single seed. *Kœberlinia*, consisting of Mexican subaphyllous shrubs, is attached to this series. It has tetramerous and diplostemonous flowers, but it is separated from all the preceding genera by the indefinite number of ovules, bi-seriate in each cell.[1]

[1] *Brunellia* has been ascribed to this group. (R. & PAV., *Prodr.*, 71, t. 12.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 361.—DC., *Prodr.*, ii. 87.—ENDL., *Gen.*, n. 5971.—B. H., *Gen.*, 313, n. 21). But MM. TRIANA & PLANCHON (in *Ann. Sc. Nat.*, sér. 5, xiv. 307) say it appeared to them "by its general features to more nearly approach the *Saxifragæ-Weinmannieæ*." The flowers are polygamous, dicœcious, and apetalous. They have a slightly concave receptacle lined with a bristling disk cut upon the edges into as many double lobes as there are sepals—viz., from four to six, and sometimes more. The calyx is valvate. The slightly perigynous stamens are double in number to the sepals, some opposite, others alternate, sterile in the female flowers. The carpels, rudimentary in the male flowers, are inserted at the bottom of the receptacle alternately with the sepals, free, each formed of a one-celled ovary containing two descending ovules with superior and exterior micropyle, and tapering above into a subulate style. The fruit is formed of one or several bivalve capsules with cartilaginous endocarp separating from the exocarp, and contains one or two seeds, with linear hilum and fleshy albumen surrounding an embryo with oval flat cotyledons and superior radicle. *Brunellia* consists of trees, not bitter, often tomentose or covered with prickles, with opposite or verticillate stipulate leaves, simple

X. CNEORUM SERIES (Fr., *Camélée*).

The flowers of *Cneorum*[1] (figs. 493–496) are regular and hermaphrodite, in four or more frequently in three parts. In the latter

Cneorum tricoccum.

Fig. 496.
Fower, the perianth taken away.

Fig. 493.
Fructiferous and floriferous inflorescence.

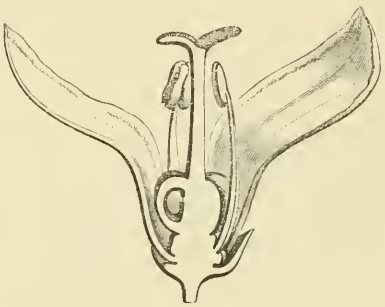

Fig. 495.
Long. sect. of flower ($\frac{3}{1}$).

case their convex receptacle bears, first, three sepals united below for a very short distance, and early ceasing to touch in the bud, then three alternate petals, longer, imbricated (or rarely contorted) in præfloration. Higher, the receptacle thickens into a glandular disk, below which three alternipetalous depressions are seen, in which the stamens are inserted, each formed of a free, subulate filament, and a two-celled, introrse anther, dehiscing by two longitudinal clefts. The gynæceum, borne by the summit of the receptacle, is composed of an ovary with three oppositipetalous cells, dorsally separated by three deep grooves, surmounted by an erect style dilated above into three stigmatiferous lobes. In the internal angle of each cell two descending campylo-

Cneorum tricoccum.

Fig. 494.
Diagram.

---

trifoliolate or imparipinnate. The flowers are united in large ramified racemes of axillary and terminal cymes; some ten species of them are known, natives of the tropical regions of the two Americas. (H. B., *Pl. Æquin.*, i. 210, t. 59–62.—H. B. K., *Nov. Gen. et Spec.*, vii. 42.—A. Juss., in *Mém. Mus.*, xii. 501.—Griseb., *Fl. Brit. W.-Ind.*, 138.—Walp., *Rep.*, i. 519; *Ann.*, i. 156; vii. 541.)

[1] *Cneorum* L., *Gen.*, n. 48.—J., *Gen.*, 369.—Lamk., *Dict.*, i. 568; Suppl., ii. 46; *Ill.*, t. 27.—K., in *Ann. Sc. Nat.*, sér. 1. ii. 357.—DC., *Prodr.*, ii. 83.—Endl., *Gen.*, n. 5954.—Payer, *Organog.*, 100, t. 23.—B. H., *Gen.*, 311, n. 11.—Ag., *Theor. Syst.*, t. 18, fig. 18, 19.—Lem. & Dcne., *Tr. Gén.*, 368.—H. Bn., in *Adansonia*, x. 317.—*Chamælea* T., *Inst.*, 651, t. 421.—Adans., *Fam. des Pl.*, ii. 369.—Gærtn., *Fruct*, i. 342, t. 70.

tropous ovules are seen, with superior and exterior micropyle, tardily separated from each other by an incomplete false oblique partition. The fruit is a three-shelled drupe, whose rather thin mesocarp covers three osseous stones, often divided by a false woody partition (transverse or oblique, and complete or incomplete) into two superposed cells, each of which contains an obliquely descending seed, folded upon itself in the shape of a horseshoe, the coats covering a fleshy albumen. The axis is occupied by a curved hook-shaped embryo, with narrow, elongated, semicylindrical, incumbent cotyledon, and superior cylindrical radicle. The two species of *Cneorum* known are shrubs, small in size, more or less bitter, unarmed, glabrous or velvety,[1] with alternate, simple, entire leaves, articulate at base, not punctuate, or only glandular towards the edges. The flowers[2] are axillary, solitary, or disposed in few-flowered cymes, with a peduncle connate for a variable distance with the axile leaf and articulate pedicels. They inhabit the Mediterranean region, and the isles on the North-Western coast of Africa.[3]

XI. ZYGOPHYLLUM SERIES (*Beancapers*).

Zygophyllum[4] has nearly regular hermaphrodite flowers. If we take, for example, those of *Z. Fabago*[5] (figs. 497–502), an eastern species, often cultivated in the garden in France, we see that the receptacle is convex, bearing, first, five sepals, with quincuncial imbricated præfloration, and five alternate petals, with short claws[6] imbricated in a variable way, or contorted in the bud. The stamens are ten in number,[7] superposed five to the sepals, and five, a little shorter, to the petals. They are composed of a free exserted filament internally,

[1] The hairs are attached by the middle of their length.

[2] Small, yellow.

[3] Barel., *Icon.*, t. 234.—Vent., *Jard. de Cels.*, t. 77.—Duham., *Arbr.*, i. 157, t. 60.—J. Saint-Hil., *Pl. Fr.*, t. 5.—Webb, *Phyt. Canar.*, t. 66.—Gren. & Godr., *Fl. de Fr.*, i. 340.—Walp., *Ann.*, vii. 540.

[4] L., *Gen.*, n. 530.—J., *Gen.*, 296.—Lamk., *Dict.*, ii. 441; Suppl., ii. 624; *Ill.*, t. 345.—DC., *Prodr.*, i. 705.—A. Juss., in *Mém. Mus.*, xii. 455, t. 15.—Spach, *Suit. à Buffon*, ii. 306.—Endl., *Gen.*, n. 6036.—Payer, *Organog.*, 68, t. 14.—B. H., *Gen.*, 266, n. 8.—H. Bn., in *Adansonia*, x. 313.—*Fabago* T., *Insl.*, 258, t. 135.—Adans., *Fam. des Pl.*, ii. 507.—Gærtn., *Fruct.*, ii. 144, t. 112. (This generic name should, strictly speaking, have the preference.)—*Fagoniastrum* Lipp. (ex Adans.).

[5] *Z. Fabago* L., *Spec.*, 551.—DC., *Prodr.*, n. 3.—*Fabago alata* Mœnch (vulg. *Faux-Câprier*).

[6] They are here white, with the base of an orange-red. This spot at the base is found more or less dark in most of the species which often have the rest of the limb yellow.

[7] Their insertion upon the receptacle is very slightly oblique.

with a sort of elongated scale, at first applied by its concavity to the ovary,[1] and of a two-celled, introrse anther, dehiscing by two longitudinal clefts.[2] The gynæceum is free and superior, composed of an ovary supported by a short, thick foot, round which the receptacle thickens into an inconsiderable glandular disk, surmounted by a style tapering towards the stigmatiferous apex, not thickened.

Zygophyllum Fabago.

Fig. 499.
Long. sect. of flower ($\frac{2}{1}$).

Fig. 497.
Floriferous branch.

Fig. 500.
Fruit.

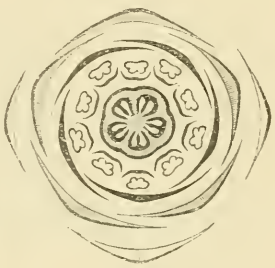

Fig. 498.
Diagram.

Fig. 501.
Seed ($\frac{3}{1}$).

Fig. 502.
Long. sect. of seed.

The ovary contains five cells, superposed to the petals, and each containing numerous ovules, inserted in two series in the internal angle, descending, anatropous, with micropyle turned outwards and upwards.[3] The fruit is a capsule[4] with five angles, loculicidal, the seeds containing under their coats[5] a not very thick fleshy albumen surrounding an embryo with elongated cotyledons. *Z. Fabago* is a suf-

[1] These tongues are developed according to Payer (*op. cit.* 69), "a little before the opening of the flower," and show themselves first upon the receptacle itself.

[2] The pollen, orange in colour, is "small ovoid; three folds; in water oval with three bands, bearing three very small papillæ." (H. Mohl, in *Ann. Sc. Nat.*, sér. 2, iii. 339.)

[3] They have two coats.

[4] The pericarp is outwardly glabrous and slightly fleshy in this species, with an endocarp also thin and almost pergameneous. It presents five prominent angles corresponding to the back of the cells, and which in certain species are developed into small wings.

[5] Three of them are distinguished: the exterior soft, cellular, greenish, swelling when in contact with water, bearing an umbilical linear cicatrice towards the middle of the length of its internal angle; a middle one harder, thin, brownish, much more enduring; an internal one thin and whitish, thickened only on a level with the cupule of the chalaza, with the albumen very adherent for almost the whole extent of its internal surface.

frutescent plant, with fluted branches, often prismatic, the leaves opposite, compound-pinnate, with two opposite unsymmetrical folioles, beyond which the rachis is often prolonged under the form of a small tongue, and with a petiole articulate at the base, accompanied by two lateral stipules. The flowers are situated in the vicinity of the axil of the stipules belonging to two opposite leaves, and at the same time almost at the bottom of the angle formed by the divergence of the axillary branches of these two leaves.[1] They are either solitary, or more frequently geminate, one of the two being younger than the other, upon the side of which it is placed.[2]

In some species of this genus, distinguished under the name of *Agrophyllum*,[3] the folioles are rounded instead of being flattened, as in the preceding; the dehiscence of the fruit is septicidal, and the ovules present slight differences in their form.[4] In others again, inhabiting Australia, and which have been made into the genus *Rœpera*[5] (fig. 503), the fruit is sometimes loculicidal and sometimes septicidal, and the staminal filaments have no interior appendage. There are, moreover, other characters which may vary in the genus *Zygophyllum*—viz., the number of folioles to each leaf, which may be reduced to one; the consistence of the stipules, which may become spinescent; the floral type, which is sometimes quaternate; the form of the disk, which is rarely cupuliform; and the number of the ovules, which may be reduced to two in each cell. Thus *Sarcozygium*[6] consists of species of *Zygophyllum*, with winged fruits,[7] the flowers of which are tetramerous, and the leaves opposite and bifoliolate, characters quite insufficient to found a genus; and *Z. portulacoides*,[8] from Bokhara, distinguished under the name of *Milliantlus*,[9] has pentagonal fruits not winged; but the calyx is developed and petaloid, while

Zygophyllum (*Rœpera*) *fabagifolium*.

Fig. 503.
Flower.

[1] The real situation of this inflorescence is such that it corresponds probably to the axil of a leaf placed lower, and has been drawn and raised with the internode, above which it becomes free. This is an extraordinary fact in most species of *Zygophyllum*, especially in the various sections of the genus *Guaiacum*. (See *Adansonia*, x. 312, 315.)

[2] In this case the inflorescence is a two-flowered uniparous cyme.

[3] Neck., *Elem.*, n. 967.

[4] The raphe is said to be free.

[5] A. Juss., in *Mém. Mus.*, xii. 454, t. 15, fig. 3.—Endl., *Gen.*, n. 6035.

[6] Bge., in *Linnæa*, xvii. 7, t. 1.—B. H., *Gen.*, 266.—H. Bn., in *Adansonia*, x. 315.

[7] As is often the case in the species of *Zygophyllum* proper.

[8] Cham. & Schltl., in *Walp. Ann.*, i. 495.

[9] *Enum. Pl. Lehm.*, 58, t. 9 (ex *Arbt. d. Nat. Ver. Riga*, i. 197).—B. H., *Gen.*, 266, n. 7.—H. Bn., in *Adansonia*, x. 313.

the petals are totally wanting. Thus defined, the genus of *Zygophyllum* comprehends some fifty species.[1] Only one belongs to America, the greater number growing in Australia, South Africa, and the East.

Beside *Zygophyllum* are ranged: *Fagonia* (figs. 504, 505), whose pentamerous flowers have naked staminal filaments, a sessile ovary, with two ovules inserted quite close to the base of the internal

Fagonia cretica.

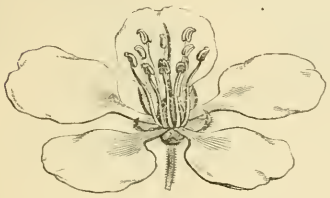

Fig. 504.
Flower ($\frac{2}{1}$).

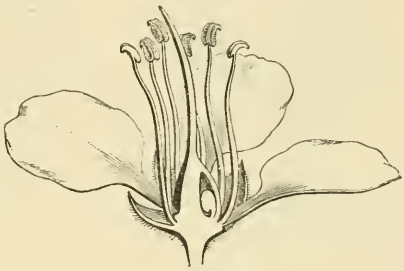

Fig. 505.
Long. sect. of flower ($\frac{3}{1}$).

angle of each cell, fruit with five monospermous shells the endocarp separating from the exocarp at maturity, and ramified herbaceous stems, with opposite leaves 1–3-foliolate; *Seetzenia*, having apetalous, isostemonous flowers; most authors also place in this group the genera *Peganum* and *Tribulus*.

Peganum[2] (figs. 506–510) has regular hermaphrodite flowers, of quaternary or quinary type. In the latter case, the convex receptacle supports five sepals, open, valvate, or slightly imbricated in præfloration, similar to leaves, some entire, others unequally dentate, or pinnatifid. The alternate petals, the same in number, are free and imbricated or contorted in the bud. The stamens are three times as numerous,[3] free, either all fertile, with two-celled, introrse

[1] Deless., *Ic. Sel.*, iii. t. 42 (*Rœpera*). — Ledeb., *Ic. Fl. Alt.*, t. 102, 140, 218, 273, 382, 383. — Webb, *Phyt. Canar.*, t. 1.—F. Muell., *Fl. Vict.*, i. 100, t. 6.—Benth., *Fl. Austral.*, i. 292.—Harv. & Sond., *Fl. Cap.*, i. 355.—Oliv., *Fl. Trop. Afr.*, i. 285.—Boiss., *Fl. Or.*, i. 909, 916 (*Miltianthus*).—Walp., *Rep*, i. 494; ii. 823; v. 385 (*Sarcozygium*), 386; *Ann.*, i. 150; ii. 245; iv. 404; vii. 479, 481 (*Rœpera*).

[2] L., *Gen.*, n. 601. — J., *Gen.*, 297. — Gærtn., *Fruct.*, ii. 87, t. 95.—Lamk., *Dict.*, iii. 76; Suppl., iii. 6; *Ill.*, t. 401.—DC., *Prodr.*, i. 712.—A. Juss., in *Mém. Mus.*, xii. 461, t. 16, fig. 8. — Spach, *Suit. à Buffon*, ii. 314. — Endl., *Gen.*, n. 6025.—Payer, *Organog.*, 69, t. 14.—Ag., *Theor. Syst.*, t. 18, figs. 16, 17.—B. H., *Gen.*, 287, n. 12.—H. Bn., in *Adansonia*, x. 299.—*Harmala* T., *Inst.*, 257, t. 133. — Mœnch, *Meth.*, 239.

[3] According to Payer, five are alternipetalous; and the ten others, representing the five oppositipetalous pieces of the androceum lined (congenitally without doubt), are superposed by pairs to the petals. The pollen is, according to Mohl (in *Ann. Sc. Nat.*, sér. 2, iii. 339), similar to that of *Ruta*.

anthers, dehiscing by two longitudinal clefts, or partly sterile; all are provided with a filament tapering at the apex and dilated at the

Peganum Harmala.

FIG. 506.
Long. sect. of flower ($\frac{2}{1}$).

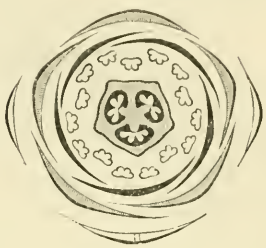

FIG. 507.
Diagram.

FIG. 508.
Dehiscent fruit ($\frac{3}{1}$).

base. Within their insertion, a slight glandular disk is seen surrounding the short foot of the two- or three-celled ovary, surmounted by an erect, twisted style, with two or three prominent stigmatiferous awns. In the internal angle of each cell a placenta is seen supporting an indefinite number of oblique anatropous ovules.[1] The fruit, accompanied by the persistent calyx, is a loculicidal capsule, with two or three valves, and contains angular seeds whose coats cover a fleshy albumen, surrounding in its turn a curved embryo. In *P. crithmifolium*,[2] generically separated under the name of *Malacocarpus*,[3] the two-celled fruit is baccate. The other characters are, however, those of three other species of the genus which are ramified, glabrous, pubescent herbs, inodorous and not punctuate, with alternate leaves, entire or irregularly pinnatifid, with two lateral, slender, unequal stipules,[4] and solitary, leaf-opposed,[5] pedunculate flowers. They are

Peganum Harmala.

FIG. 509.
Seed ($\frac{6}{1}$).

FIG. 510.
Long. sect. of seed.

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[1] They have a double coat.

[2] RETZ, *Obs.*, ii. 34 (nec GEORG.). — *P. Harmala*, β *crithmifolium* DC.—BIEB., *Fl. Taur-cauc.*, i. 364.

[3] FISCH. & MEY., *Ind. Sem. Hort. Petrop.*, ix. 78.—WALP., *Rep.*, v. 394.

[4] These are perhaps the inferior lobes of the leaf, but little developed.

[5] The flowers have doubtless here, as in other species of *Zygophyllum*, been drawn upon the axis above their axile leaf.

found in the Mediterranean region, the East, tropical Asia, and as far as Mexico.[1]

The flowers of *Tribulus* (Fr., *Herses*[2]) (figs. 511–513) are also hermaphrodite, regular, pentamerous, with imbricated or contorted sepals. Of the six stamens,[3] inserted round the base of the hypogynous disk with ten lobes, five are longer, alternipetalous, and

Tribulus terrestris.

Fig. 511.
Flower ($\frac{3}{1}$).

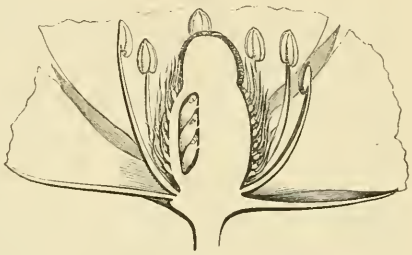

Fig. 512.
Long. sect. of flower ($\frac{8}{1}$).

more exterior, with a filament provided outwardly with a basilar gland. All have a two-celled, introrse anther, dehiscing by two longitudinal clefts.[4] The superior gynæceum is formed of a sessile ovary, which in *T. terrestris*, and other analogous species, has five oppositipetalous cells, and is surrounded by a short, thickset style, divided into five vertical stigmatiferous lobes, alternating with the cells. In each of them are several descending and anatropous ovules, inserted in the internal angle, with superior and exterior micropyle.[5] In certain other species of this genus, there is a greater number of ovary cells, containing either numerous descending ovules, or sometimes only one.

Tribulus terrestris.

Fig. 513.
Fruit ($\frac{3}{2}$).

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[1] Reichb., *Ic. Fl. Germ.*, v. t. 158.—Sibth., *Fl. Græc.*, t. 455.—Boiss., *Fl. Or.*, i. 917.—Walp., *Rep.*, i. 517; ii. 824; *Ann.*, iv. 414; vii. 509.

[2] *Tribulus* T., *Inst.*, 265, t. 141.—L., *Gen.*, n. 532.—Adans., *Fam. des Pl.*, ii. 507.—J., *Gen.*, 293.—Gærtn., *Fruct.*, i. 335, t. 69.—Lamk., *Ill.*, t. 346.—Poir., *Dict.*, viii. 43; Suppl., v. 338.—DC., *Prodr.*, i. 703 (part.).—A. Juss., in *Mém. Mus.*, xii. 451, t. 14, fig. 1.—Turp., in *Dict. Sc. Nat.* Atl., t. 123.—Endl., *Gen.*, n. 6030.—Payer, *Organog.*, 60, t. 14.—A. Gray, *Gen. Ill.*, t. 145.—B. H., *Gen.*, 264, n. 1.—H. Bn., in *Adansonia*, x. 313 (incl.: *Ehrenbergia* Mart., *Heterozygia* Bge., *Kallstræmia* Scop., *Tribulopsis* R. Br.).

[3] Five are often sterile, or wanting in *Tribulopsis* (R. Br., in *Sturt Exp. App.*, 70).

[4] The pollen is, according to H. Mohl (in *Ann. Sc. Nat.*, sér. 2, iii. 339), "spheroid, membrane externally cellular (*T. alatus*, *T. terrestris*, *T. lanuginosus*, *Ehrenbergia tribuloides*)."

[5] With double coat. Generally disposed in one single vertical series at maturity.

The fruit is dry, formed of from five to a dozen shells, horny or bony, furnished dorsally with wings, tubercles or prickles of various shape. These shells separate definitely from each other;[1] and beneath their thick indehiscent wall is found one or several oblique descending seeds, with fleshy exalbuminous embryo.

Tribulus consists of herbs, often extended upon the ground, and covered with hairs. The leaves are opposite or alternate by abortion, compound-paripinnate,[2] accompanied by two lateral stipules. The flowers[3] are solitary on a level with the insertion of the leaves, to which they are lateral.[4] Some fifteen species[5] of this genus are distinguished, natives of all the warm and temperate regions of the world.

Beside *Tribulus* are ranged also other herbaceous *Zygophylleæ: Sisyndite*, consisting of plants from the Cape, having uniovulate ovary cells, a fruit with five shells, dehiscing by their internal edge, and spartioid stems, bearing compound-pinnate leaves; and *Augea*, from the same country, composed of plants with the habit and foliage of certain *Ficoideæ*, and whose flowers, with concave receptacle, have stamens inserted on the edge of a membranous, cylindrical disk, surrounded by trifid laminæ similar to their filaments sometimes described as petals, and a capsular fruit with ten monospermous cells.[6]

Guaiacum (fig. 514) consists of woody American plants, taking us back to the floral organization of *Zygophyllum*. The floral receptacle is rather elongated, in the form of a small truncate cone in the species of *Guaiacum* proper. The androceum is diplostemonous;

---

[1] It is principally because of the differences presented by the fruit that *Kallstrœmia* has been generally distinguished [Scop., *Introd.*, 937;—Endl., *Gen.*, n. 6031;—*Ehrenbergia* Mart., *Nov. Gen. et Spec.*, ii. 72, i. 163 (nec Spreng.);—*Heterozygis* Bge., *Vérz. Alt. Pfl.*, 82, not.]. The shells, indefinite in number, are united into an angular pyramid on a common axis extending beyond them above, and from which they afterwards separate without opening; within they present a groove, and without rugose unequal crests.

[2] Or rather, doubtless, by the parts being drawn up, one of the leaves remaining at a given level, while the other is more or less elevated beyond upon the axis of the plant.

[3] Yellow or white.

[4] Consequently also caused by the drawing away of the parts.

[5] H. B. K., *Nov. Gen. et Spec.*, vi. 11.—Sibth., *Fl. Græc.*, t. 372.—Reichb., *Ic. Fl. Germ.*, v. t. 161.—Harv. & Sond., *Fl. Cap.*, i. 352.—Oliv., *Fl. Trop. Afr.*, i. 283.—Grisb., *Fl. Brit. W.-Ind.*, 134.—A. Gray, *Man.*, ed. 5, 110.—Chapm., *Fl. S. Unit.-St.*, 64.—Benth., *Fl. Austral.*, i. 287.—Gren. & Godr., *Fl. de Fr.*, i. 327.—Walp., *Rep.*, i. 493; ii. 242 (*Tribulopsis*), 822; iv. 403; *Ann.*, i. 149; ii. 242, 244 (*Kallstrœmia*); v. 403; vii. 477, 478 (*Tribulopsis*).

[6] Near these genera is placed *Sericodes*, a ramose shrub of Mexico, unknown to us, having simple sessile fasciculate leaves with small spinescent stipules and fascicuiate flowers, with five persistent sepals, five entire petals, ten subperigynous stamens, with five uniovulate ovary cells, and a fruit whose five very velvety shells are indehiscent, and separate at maturity from the columella. The ovules are descending.

and in *G. sanctum*, for example, the subulate filaments are not provided with an interior scaly appendage; but this exists in most of the species, sometimes whole, sometimes more or less cut at the summit. The gynæceum, analogous to those of *Zygophyllum*, has an

Guaiacum sanctum.

FIG. 514.
Floriferous branch ($\frac{1}{2}$).

ovary with two or three pluriovulate cells in *G. officinale;* but in other species, from three to five may be counted. The septicidal fruit has also a variable number of shells, with dry wall, more or less coriaceous, angular or winged dorsally, each containing a descending seed, the coats covering a more or less hard albumen, often wrinkled outwardly, enveloping a large greenish embryo, with foliaceous cotyledons and superior radicle. The species of *Guaiacum* proper are trees or shrubs with opposite, paripinnate leaves, formed of two or a great number of opposite, unsymmetrical folioles, accompanied by caducous stipules. The flowers are pedicellate, solitary, gemi-

nate, or in various numbers, on a level with the insertion of the leaves, but lateral to them.

We have connected with this genus as simple sections, corresponding to most of those admitted in the genus *Zygophyllum*: *Porlieria*, composed of species from Western temperate America, having a short support to the ovary, staminal filaments lined by a scale, from three to five carpels to the glabrous fruit, and compound-pinnate leaves; *Pintoa*, a Chilian shrub, having a short, thick ovary support, staminal appendages cut pretty deeply, a capsular fruit with five grooves comparable to those of *Zygophyllum Fabago*, and paripinnate leaves; *Bulnesia*, a spartioidal shrub of the same country, with small paripinnate leaves, has staminal appendages similar to those of *Pintoa*, but with fruits the cells of which are prolonged into pretty large vertical wings, as in *Rœpera* and *Sarcozygium*. Finally, *Larrea*, consisting of balsamic shrubs from the temperate Western regions of the two Americas, with pinnate leaves, bi- or plurifoliolate, short ovary support, staminal scales, simple, bifid or deeply cut at the summit, and fruits the four or five carinate shells of which are villous; *Plectrocarpa*, a shrub from Mendoza, nearly allied to the preceding genus, with thorny branches, and slightly irregular imparipinnate leaves, only two ovules in each cell, the fruit being elongated and velvety, each of its five shells armed dorsally with a subulate spur. *Chitonia*, a Mexican shrub, with pinnate leaves opposite or alternate, is also nearly allied to the preceding genera. The flowers are tetramerous, the corolla very large, regular, with eight inappendiculate stamens, a style with large stigmatiferous head, pluriovulate ovary cells, and having for fruit a four-winged or four-valved capsule, the cells usually containing two descending seeds, with embryo surrounded by fleshy albumen.

XII. NITRARIA SERIES.

Nitraria[1] (figs. 515–520) alone constitutes this small series; it has regular, hermaphrodite flowers. The convex receptacle bears an

[1] L., *Gen.*, n. 602.—Adans., *Fam. des Pl.*, ii. 447.—J., *Gen.*, 316.—Gærtn., *Fruct.*, i. 279, t. 58.—Lerch., in *Nov. Act. Nat. Cur.*, v. App., 162.—Lamk., *Ill.*, t. 403.—Poir., *Dict.*, iv. 492; Suppl., iv. 99.—DC., *Prodr.*, iii. 456.—Endl., *Gen.*, n. 5711.—Jaub. & Spach, *Consp. Gen. Nitraria* (in *Ann. Sc. Nat.*, sér. 3, xiii. 21).—Lindl., *Veg. Kingd.*, 389, fig. 275.—Payer, *Organog.*, 121, t. 26.—Ag., *Theor. Syst.*, 367.—B. H., *Gen.*, 265, n. 5.—H. Bn., in *Payer Fam. Nat.*, 313.—*Osyris* Gmel., (nec L., ex Adans.).

imbricated calyx, with five deep divisions, and five alternate petals, with cucullate apex, and valvate-induplicate in the bud. The stamens are free and hypogynous, with naked filaments, and two-celled,

Nitraria Schoberi.

Fig. 519.
Fruit ($\frac{2}{1}$).

Fig. 515.
Floriferous branch.

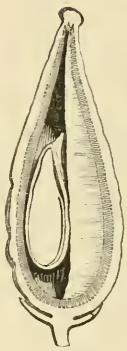

Fig. 520.
Long. sect. of fruit.

introrse anthers, dehiscing by two longitudinal clefts. Very rarely there are but five of them alternipetalous; generally they are deduplicate, and each alternate stamen may be accompanied by

Nitraria Schoberi.

Fig. 516.
Flower ($\frac{2}{1}$).

Fig. 517.
Diagram.

Fig. 518.
Long. sect. of flower.

two lateral stamens more exterior, which seem oppositipetalous (fig. 517). When some of these latter are wanting, from six to fourteen may be counted. The gynæceum is superior, formed of ovary often three-celled, surmounted by a short style, with stigmatiferous apex divided into as many small lobes as there are cells. In the internal angle of these a placenta is seen supporting a descending ovule, with superior and interior micropyle. The fruit (figs. 519, 520) is an elongated drupe tapering at the apex, accompanied at the

base by the persistent calyx. The stone, hard, scorbiculate or radiate outwardly,[1] usually contains one monospermous cell, and often opens at the summit into six subulate valves, alternately wide and narrow. The seed contains under its coats a fleshy exalbuminous embryo, with thick plano-convex cotyledons, and short superior radicle.

Nitraria consists of shrubs, the species, not very numerous,[2] growing in the salt plains of warm Western Asia, North Africa, and Australia, and whose aspect sometimes recalls that of certain species of *Salsolaceæ*, growing in the same conditions. The branches, often whitish and rigid, are sometimes armed with spines. The leaves are alternate or fasciculate, simple, entire or trifid at the summit, contracted at the base, slightly fleshy, accompanied by two small stipules. The flowers[3] are arranged in bunches of scorpioid cymes.

XIII. CORIARIA SERIES (Fr., *Redoul*).

Coriaria[4] (figs. 521–525) has regular, hermaphrodite, and polygamous flowers. In the hermaphrodite flowers of the European species of the genus, *Coriaria*, with Myrtle leaves, we may observe a tolerably elevated conical receptacle, bearing at the base five sepals, arranged in the bud in quincuncial præfloration, and five alternate short, thick, fleshy petals, very slightly imbricated, or not even touching each other by their edges in the bud. The androceum is composed of ten hypogynous stamens, five of which, superposed to the sepals, are inserted lower and more externally than the other five, which are shorter, and superposed to the petals. Each stamen is formed

[1] There are three more or less distinct faces with very diverse nerve-shaped configuration, an interior crustaceous layer separating definitely from the bony exterior layer. The mesocarp, often thin, is usually pulpy.

[2] Two or three, according to some authors, six or seven according to others.—Pall., *Fl. Ross.*, i. t. 50.—Desf., *Fl. Atl*, i. 372.—Andr., *Bot. Repos.*, t. 519.—Jaub. & Spach, *Ill. Pl. Or.*, iii. 139, t. 293–295.—Boiss., *Fl. Or.*, i. 918.—Oliv., *Fl. Trop. Afr.*, i. 288.—Miq., in *Pl. Preiss.*, i. 164 (*Zygophyllum*).—F. Muell., *Fl. Vict.*, 92, 227, t. Suppl. 7.—Benth., *Fl. Austral.*, i. 291.—Walp., *Rep.*, i. 542; *Ann.*, ii. 265; vii. 479.

[3] Small white or greenish, often fragrant. The fruits are red or blackish.

[4] *Coriaria* Nissol., in *Act. Acad. Par.* (1711), t. 12.—L., *Gen.*, n. 458.—Adans., *Fam. des Pl.*, ii. 446.—J., *Gen.*, 441.—Lamk., *Dict.*, vi. 86; Suppl., iv. 656; *Ill.*, t. 822.—DC., *Prodr.*, i. 739.—Turp., in *Dict. Sc. Nat.*, Atl., t. 288, 289.—Spach, *Suit. à Buffon*, iii. 80.—Endl., *Gen.*, n. 5596.—Payer, *Organog.*, 49, t. 10.—B. H., *Gen.*, 429.—Schnizl., *Iconogr.*, xiv. t. 238.—Lem. & Dcne., *Tr. Gen.*, 371.—H. Bn., in *Adansonia*, x. 318.—*Heterocladus* Turcz., in *Bull. Mosc.* (1847), ii. 152.—*Heterophylleia* Turcz., *op. cit.* (1848), i. 591.—*Deu* Feuill. (ex Adans.).

of a free filament, and elongated, two-celled, introrse anther, dehiscing by two longitudinal clefts.[1] Higher, in front of the sepals, the sides of the receptacular cone bear five alternipetalous carpels, inde-

Coriaria myrtifolia.

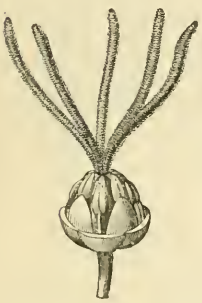

FIG. 522.
Flower, calyx taken away.

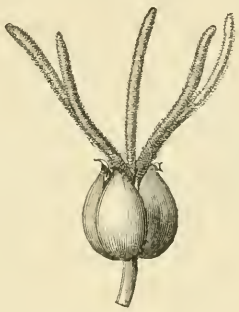

FIG. 521.
Female flower ($\frac{3}{1}$).

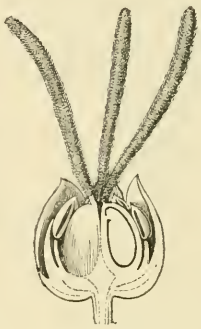

FIG. 523.
Long. sect. of flower.

pendent of each other, the one-celled ovary tapering above into a long, slender, flexuous style, quite covered with stigmatic papillæ. In the internal angle of each ovary a parietal placenta is found supporting one single, anatropous, descending ovule with superior and

Coriaria myrtifolia.

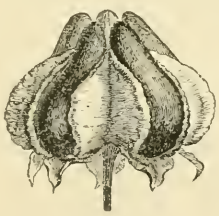

FIG. 524.
Fruit ($\frac{3}{1}$).

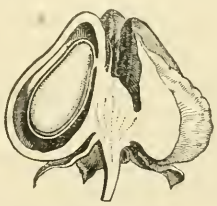

FIG. 525.
Long. sect. of fruit.

inferior micropyle, and with dorsal raphe.[2] The fruit is formed of five carpels, at first drupaceous, then almost completely dry, borne by the receptacle become fleshy, and it is furnished at the base with the persistent calyx, and the petals become thicker, fleshy, prominent, corner-shaped or carinate in the interval of the carpels. In each of

[1] The pollen in *C. myrtifolia* is "rounded; upon three but slightly prominent angles is an oval pore with large round halo." (H. MOHL, in *Ann. Sc. Nat.*, sér. 2, iii. 337.)

[2] With double coat.

these is found a descending seed, the coats[1] covering a fleshy embryo with short superior radicle and plano-convex cotyledons. In the male flowers, the carpels remain rudimentary and sterile, and the stamens are, as in the hermaphrodite flowers, provided with long pendant filaments. In the female flowers, on the contrary, the stamens are sterile, short, and erect.

C. myrtifolia is a glabrous shrub, with square angular branches, bearing opposite, simple, entire leaves, 3–5-nerved at the base, provided with a short petiole, accompanied by two very small caducous, lateral stipules. The flowers are arranged in racemes at the summit of the leafy branches. Each is supported by a pedicel, accompanied by two lateral caducous bractlets. Among the species of the genus, three or four in number,[2] inhabiting the Mediterranean region, Central Eastern Asia, New Zealand, and South Western America, we find sarmentose stems, flowers in verticils of threes, and female flowers and fruits with from six to ten carpels.

XIV. SURIANA SERIES.

Suriana[3] (figs. 526–529) has been lately ascribed to the Quassias. The flowers are hermaphrodite and regular, the receptacle having an almost flat upper surface. The calyx is formed of five sepals, disposed in quincuncial præfloration, and the corolla of five alternate petals, imbricated or contorted. The stamens are ten in number, and superposed, five to the sepals, and five, shorter, to the petals; they are free, formed of a subulate filament, and a short, two-celled, introrse anther, dehiscing by two longitudinal clefts, sometimes aborted in the oppositipetalous stamens. The gynæceum is constituted of five oppositipetalous independent carpels, whose ovary, supported by a short foot, is surmounted by a style inserted towards

[1] These are: a soft thin coat, representing the episperm; then more internally a plate, almost always inconsiderable but of variable thickness, sometimes enduring, which has been regarded (perhaps without sufficient demonstration of the fact) as a rudimentary albumen.

[2] Reichb., *Ic. Fl. Germ.*, v. t. 160. — H. B. K., *Nov. Gen. et Spec.*, vii. 168, t. 636.—Wall., *Pl. As. Rar.*, t. 289.—A. Gray, in *Mem. Amer. Acad.* (1862), 383, not.—Hook. f., *Man. N.-Zeal. Fl.*, 16, 727.—C. Gay, *Fl. Chil.*, i. 491.—Gren. & Godr., *Fl. de Fr.*, i. 330.—Walp., *Rep.*, i. 528; *Ann.*, vii. 649.

[3] Plum., *Gen.*, 37; *Icon.* (ed. Burm.), t. 249.—L., *Gen.*, n. 581.—Adans., *Fam. des Pl.*, ii. 249.—J., *Gen.*, 339.—Lamk., *Ill.*, t. 389.—Poir., *Dict.*, vii. 522; Suppl., v. 265.—DC., *Prodr.*, ii. 91.—Endl., *Gen.*, n. 5953.—B. H., *Gen.*, 313, n. 20.—J. G. Ag., *Theor. Syst.*, 169, t. 4.— H. Bn., in *Adansonia*, x. 317.

the base of the internal angle, slightly thickened at its stigmatiferous apex. In the ovary cell a placenta is seen supporting two descending collateral ovules, very incompletely anatropous, the short

Suriana maritima.

Fig. 526. Flower ($\frac{4}{1}$).

Fig. 528. Fruit ($\frac{3}{1}$).

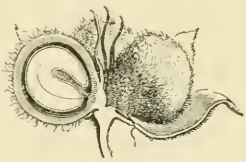

Fig. 529. Long. sect. of fruit.

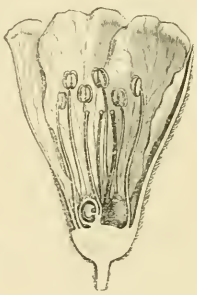

Fig. 527. Long. sect. of flower.

raphe looking downwards and inwards. The fruit, accompanied by the persistent calyx, is formed of five drupes (or fewer) almost completely dry, the stone containing a campylotropous ascending seed, the coats covering a large fleshy embryo, folded upon itself, so that the incumbent cotyledons and superior radicle have their summits near the point of attachment. *S. maritima*,[1] the only known species, is a shrub frequently met with on the sea-coast of all tropical countries. It is tastless, covered with capitate hairs. The leaves are alternate, simple, narrow, articulate at the base, besprinkled with glandular punctures. The flowers are united towards the extremity of the branches in false racemes of uniparous, short, few-flowered, but ramified cymes.

Rutaceæ,[2] thus comprised, constitute a family by concatenation with many affinities, the fourteen series presenting the general characters which follow.

I. Ruteæ.[3]—Flowers regular (or exceptionally irregular), with convex receptacle. Sepals, petals, and stamens free, inserted below a

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[1] L., *Spec.*, 284.—Wight & Arn., *Prodr.*, 361.—Benth., *Fl. Austral.*, i. 375.—Oliv., *Fl. Trop. Afr.*, i. 313.—Walp., *Ann.*, vii. 541.

[2] *Rutæ* J., *Gen.* (1789), 296.—*Rutaceæ* DC., *Prodr.*, i. (1824), 709, Ord. 51.—A. Juss., *Mém. sur les Rutacées* (in *Mém. Mus.*, xii.461).—Bartl., *Ord. Nat.*, 389.—Lindl., *Introd.*, ed. 2, 130; *Veg. Kingd.*, 469, Ord. 176.—Endl., *Gen.*, Ord. 270.—B. H., *Gen.*, 278, Ord. 39.

[3] *Ruteæ* A. Juss., *loc. cit.* (1825), 78.—B. H., *Gen.*, 280, Trib. 2.—*Rutacæ* Endl., *loc. cit.*—*Fraxinelleæ* Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 149 (1823).—*Dictamneæ* Ag., *Theor. Syst.*, 227.

hypogynous disk or the foot of a gynæceum, with oppositipetalous carpels united by their styles, independent or united for a variable distance in the ovary. Ovules 2–∞, transverse or descending with exterior and superior micropyle. Fruit in several shells (rarely fleshy). Seeds albuminous, with embryo often curved.—Herbs, often frutescent at base, whose divers organs, especially the leaves, often pinnatisect, are covered with glandular, pellucid, fragrant spots. Plants of temperate regions, especially the North.—(5 genera.)

II. Cusparieæ.[1]—Flowers regular, or oftener irregular, with convex receptacle. Petals often united, or adhering between themselves to a variable distance, forming a more or less elongated tube. Androceum often diplostemonous, with stamens often united to a variable distance with the tube of the corolla, all fertile, or more generally partly sterile and rudimentary. Carpels generally free in the ovary, containing two descending ovules, with exterior and superior micropyle. Fruit generally formed of independent shells, with elastic dehiscence, the endocarp separating from the exocarp. Seeds albuminous or exalbuminous, with cotyledons more or less convolute. —Generally wood plants, usually glandular-punctuate, inhabiting tropical America.—(9 genera.)

III. Diosmeæ.[2]—Flowers regular, generally small, hermaphrodite, with receptacle convex, or more or less concave, edged by a perigynous or hypogynous disk. Petals free, often with erect claw. Androceum isostemonous or diplostemonous, inserted outside the disk, the oppositipetalous stamens sometimes sterile. Gynæceum formed of 1–5 oppositipetalous carpels, generally free in the ovary,[3] the styles united into a common column. Ovules two in each carpel, descending with superior and exterior micropyle. Shells often rostrate, with separable endocarp. Seeds exalbuminous; embryo thick and straight, with fleshy cotyledons.—Ericoidal shrubs of South Africa, with narrow leaves,[4] often imbricated, simple, coriaceous, punctuate.—(11 genera.)

IV. Boronieæ.[5]—Flowers generally constructed[6] like those of

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[1] *Cusparieæ* DC., in *Mém. Mus.*, ix. 141 (1822).—Endl., *loc. cit.*, 1150, Trib. 1.—Ag., *op. cit.*, 221, t. 19.

[2] *Diosmeæ* R. Br., in *Flind. Voy.* (1814), ii. 545.—A. Juss., *loc. cit.*, 883.—Bartl., *Ord. Nat.*, 386.—Endl., *Gen.*, 1149, Ord. 251.—B. H., *Gen.*, 288, Trib. 3.—Ag., *op. cit.*, 229, t. 19.

[3] Except in *Calodendron*.

[4] The leaves of *Calodendron* are single, wide, and membranous.

[5] *Boronieæ* Bartl., *Ord. Nat.*, 388.—Endl., *Gen.*, 1154, Trib. 4.—Ag., *op. cit.*, 229.—B. H., *Gen.*, 291.—*Diosmeæ Australasicæ* A. Juss., *loc. cit.*—*Diplolæneæ* Ag., *loc. cit.*

[6] Except those of *Diplolæna*, which are destitute of a true calyx.

Diosmeæ. Seeds with cylindrical embryo, surrounded by a fleshy albumen.—Oceanian shrubs, with simple or compound leaves, glandular-punctuate.—(15 genera.)

V. ZANTHOXYLEÆ.[1]—Flowers regular, frequently polygamo-diœcious, with convex receptacle, rarely cupuliform. Petals free, equal. Androceum isostemonous or diplostemonous, with free pieces. Carpels frequently free in the ovary (*Euzanthoxyleæ*), or united in a plurilocular ovary (*Toddalieæ*[2]). Ovules 2, or rarely 1, descending, with superior and exterior micropyle. Fruit dry, dehiscent or fleshy, with or without stone. Seeds albuminous or exalbuminous.—Trees or shrubs from all the warm regions of the world, with alternate or opposite, simple or oftener 3-foliolate or compound-pinnate leaves, generally punctuate.—(28 genera.)

VI. AMYRIDEÆ.[3]—Flowers regular, hermaphrodite or polygamous-diœcious, 4–5-merous. Petals free, valvate or imbricate. Androceum isostemonous or diplostemonous. Gynæceum unicarpellary; ovary 1-celled, containing two descending ovules, with exterior and superior micropyle. Fruit fleshy. Seed descending, with thick, fleshy, exalbuminous embryo. Trees or shrubs, generally American, with compound leaves, 1–∞-foliolate punctuate.—(3 genera.)

VII. AURANTIEÆ.[4]—Flowers regular, hermaphrodite. Petals free, hypogynous. Stamens double in number to petals, or ∞, free or polyadelphous. Carpels united in a plurilocular ovary; style often articulate at the base, or caducous. Ovules 1–∞, descending. Berry often pulpy, cortical. Seeds exalbuminous.—Trees and shrubs of the tropical regions of the Old World, aromatic, punctuate, with compound leaves, 1–∞-foliolate.—(8 genera.)

VIII. BALANITEÆ.[5]—Flowers hermaphrodite, pentamerous, diplo-

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[1] NEES & MART., in *Nov. Act. Nat. Cur.*, xi. (1823).—A. JUSS., in *Mém. Mus.*, xii. 422, 497 (1825).—ENDL., *Gen.*, 1147, Ord. 250.—AG., *op. cit.*, 224, t. 19.—B. H., *Gen.*, 295, Trib. 5.—*Zanthoxylaceæ* LINDL., *Veg. Kingd.*, 472, Ord. 177.—*Pteleaceæ* K., in *Ann. Sc. Nat.*, sér. 1, ii. (1824), 345.—*Terebinthaceæ* (part.) J., *Gen.*, 368.—DC., *Prodr.*, ii. 82.—*Pilocarpeæ* BARTL., *Ord. Nat.*, 388.—AG, *op. cit.*, 221.

[2] *Toddalieæ* B. H., *Gen.*, 300, Trib. 6.

[3] *Amyrideæ* R. BR., *Congo*, 431 (1818).—K., in *Ann. Sc. Nat*, sér. 1, ii. 353.—ENDL., *Gen.*, 1139.—AG., *op. cit.*, 231.—*Burseraceæ* B. H., *Gen.*, 327, Trib. 2.—*Terebinthaceæ* (part.) J., *Gen.*, 368.—*Amyridaceæ* LINDL., *Introd.*; *Veg. Kingd.*, 459, Ord. 171.

[4] J., *Gen.*, 260.—B. H., *Gen.*, 303, Trib. 7.—*Hesperideæ* (part.) VENT., *Tabl.*, iii. 154.—*Aurantiaceæ* CORR., in *Ann. Mus.*, vi. 376.—MIRB., in *Bull. Soc. Philom.* (1813), 379.—DC., *Prodr.*, i. 535, Ord. 33.—ENDL., *Gen.*, 1043, Ord. 224.—LINDL., *Veg. Kingd.*, 457, Ord. 150.—H. BN., *Aurant.* (see p. 405, note 1).—AG., *op. cit.*, 222, t. 19.—OLIV., *The Nat. Ord. Aurant.* (in *Journ. Linn. Soc.*, v. Suppl., 1).

[5] *Balaniteæ* ENDL., *Gen.* (1841), 547 (ex LINDL., *Veg. Kingd.* (1846), 459).—PL., in *Ann. Sc. Nat.*, sér. 2, iii. 346. The author connects this genus with the *Meliaceæ*, but BENTHAM & HOOKER have made it a *Simarubeæ*.

stemonous. Ovary plurilocular, surrounded by a thick pulviniform disk. Ovules solitary, descending, with exterior and inferior micropyle. Style single. Fruit drupaceous, with bony stone, monospermous. Seed exalbuminous; embryo fleshy.—Thorny shrubs of the Old World, with 2-foliolate leaves; insipid, not punctuate.—(1 genus.)

IX. Quassie.æ.[1]—Flowers hermaphrodite or declinous, regular, isostemonous or diplostemonous. Stamens often furnished with a scale within the base of their filament. Gynæceum inserted immediately above the androceum, or separated from it by a receptacular internode more or less elongated. Carpels oppositipetalous, equal in number or inferior to that of the petals, free (*Equassiæ*), or united (*Picramnieæ*)[2] in the ovary, united, or more rarely free, in the styles. Ovules generally solitary, and descending, with exterior and superior micropyle (more rarely 2–∞). Fruits dry, rarely dehiscent or samaroid, generally fleshy. Albumen fleshy, or nil.—Woody plants, mostly natives of warm countries, with simple or compound exstipulate leaves, and of which all parts, usually provided with glandular punctures, are generally intensely bitter.—(27 genera.)

X. Cneoreæ.[3]—Flowers hermaphrodite, 3–4-merous, isostemonous. Ovary with 3, 4 cells, often divided into secondary uniovulate cells. Ovules 1, 2, amphitropous, descending, with superior and exterior micropyle. Fruit drupaceous, with 3, 4 shells, indehiscent, the stone often 2-locellate. Seeds albuminous, with recurved embryo.—Shrubs, slightly bitter, with alternate simple leaves, punctuate upon the edges, and axillary flowers collected in cymes.—(1 genus.)

XI. Zygophyllæ.æ.[4]—Flowers hermaphrodite, regular or irregular, rarely apetalous.[5] Stamens hypogynous, equal in number to the petals, or double or triple in number, with free filaments, often accompanied by a scale within the base. Gynæceum sessile or stipitate, with several cells (2–12), superposed to the petals when they

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[1] *Simarubeæ* DC., *Diss. Ochnac.* (in *Ann. Mus.*, xvii. 323; *Prodr.*, i. 733, Ord. 752.—A. Juss., in *Mém. Mus.*, xii. 512.—Ag., *op. cit.*, 223.—B. H., *Gen.*, 306, Ord. 40. — *Simarubaceæ* Rich., *Anal. du Fr.*, 21, (1808).—Lindl., *Introd.*, ed. 2, 120; *Veg. Kingd.*, 476, Ord. 179.—Endl., *Gen.*, 1143, Ord. 219.—*Ailantheæ* Ag., *op. cit.*, 223.

[2] *Picramnieæ* B. H., *Gen.*, 307, 313, Trib. 2.

[3] *Cneoreæ* Webb, in *Hook. Lond. Journ.*, i. (1842), 254. — Ag., *op. cit.*, 228, t. 18. — *Pteleaceæ* (part.) K., *loc. cit.*—DC., *Prodr.*, ii. 83.— *Connaraceæ* (part.) Endl., *Gen.*, 1141.

[4] R. Br., in *Flind. Voy.*, ii. 545 (1814).—DC., *Prodr.*, i. 703, Ord. 50.—A. Juss., in *Mém. Mus.*, xii. (1825), 450.—Endl., *Gen.*, 1161, Ord. 253.—Ag., *op. cit.*, 205, t. 18.—B. H., *Gen.*, 262, Ord. 37. — *Zygophyllaceæ* Lindl., *Introd.*, ed. 2, 133; *Veg. Kingd.*, 478, Ord. 180.

[5] In *Augea* (?).

are the same in number, 1–∞-ovulate. Ovules often descending, with superior and exterior micropyle. Fruit dry, crustaceous or coriaceous, sometimes with from 2–12 shells separating from the columella, or with septicidal cells. Seeds albuminous or exalbuminous.—Woody or herbaceous plants, not bitter, not punctuate, with branches often articulate, leaves opposite, or alternate by abortion, accompanied by geminate stipules, almost constantly compound, 2–∞-foliolate. Flowers generally drawn upon the axis, which bears them to the side of a leaf at a greater elevation.—(11 genera.)

XII. NITRARIEÆ.[1]—Flowers hermaphrodite, with cucullate petals, valvate-induplicate, with stamens double or triple in number to the petals; ovary 2–6-celled, with a single descending ovule in each cell, superior and exterior micropyle. Fruit fleshy, with stone fluted or reticulated outwardly, 6-valved at apex, monospermous. Embryo fleshy, exalbuminous.—Shrubs from the salt plains of the temperate regions of the Old World, not bitter, not punctuate, with simple alternate leaves, and flowers in uniparous scorpioid cymes.—(1 genus.)

XIII. CORIARIEÆ.[2]—Flowers hermaphrodite or polygamous, with diplostemonous androceum, free carpels alternate with the petals when they are the same in number, with free styles. Ovules solitary, descending, with interior and superior micropyle. Fruit formed of 5–10 shells, surrounded by accrescent petals, coriaceous or fleshy. Seeds exalbuminous, or with albumen reduced to a more or less hard membrane.—Shrubs, often sarmentose, with opposite or verticillate leaves, not punctuate, with axillary inflorescence.—(1 genus.)

XIV. SURIANEÆ.[3]—Flowers hermaphrodite, with diplostemonous androceum, free, oppositipetalous carpels, and gynobasic free styles. Ovules geminate in each ovary, descending, with superior and exterior micropyle. Fruit formed of free drupes, surrounded by the persistent calyx, with thin mesocarp, and solitary ascending seed. Embryo exalbuminous, folded upon itself, with superior and

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[1] *Nitrariaceæ* LINDL., *Nat. Syst.*, ed. 1, n. 149 (1830).—MART., *Consp.*, n. 255 (1835).—ENDL., *Gen.*, 1094.—AG., *op. cit.*, 367.—*Ficoideæ spuriæ* DC., *Prodr.*, iii. 456.—*Malpighiaceæ* (part.) LINDL., *Veg. Kingd.*, 388.—*Zygophylleæ* (part.) B. H., *Gen.*, 265.

[2] DC., *Prodr.*, i. (1824), 730, Ord. 64.—LINDL., *Nat. Syst.*, ed. 1, n. 106; *Veg. Kingd.*, 475.—ENDL., *Gen.*, 1065.—AG., *op. cit.*, 289, t. 21.—B. H., *Gen.*, 429, Ord. 64.

[3] *Surianeæ* ENDL., *Gen.*, 1140.—*Surianaceæ* WIGHT & ARN., *Prodr.*, i. 360.—LINDL., *Nat. Syst.*, ed. 2, 142, Ord. 107; *Veg. Kingd.*, 509.—AG., *op. cit.*, 169, t. 14.—*Terebinthaceæ* (part.) DC., *Prodr.*, ii. 91.—*Simarubeæ* (part.) B. H., *Gen.*, 313.

interior radicle, descending.—An insipid, punctuate shrub, with alternate, simple leaves.—(1 genus.)

In these fourteen series, comprising a hundred and twenty-three genera,[1] the characters which serve to separate them from each other are, as we have seen : those drawn from the consistence of the stem,[2] the arrangement of the leaves upon it, the presence or absence of stipules, the bitter flavour of the parts (particularly the leaves), or the existence of glandular-pellucid punctures, generally the channel of the aromatic or fetid odour;[3] the mode of inflorescence, hermaphrodite or declinous nature of the flowers, the shape of the floral receptacle, and consequently the insertion of the stamens;[4] the number of parts in the perianth and their præfloration, the number of stamens and of the verticils according to which they are arranged, the independence or union of their filaments, the presence or absence at their base of an interior scale, and of a gland at the summit of the anthers sometimes fertile sometimes sterile. The form and size of the disk, hypogynous or rarely perigynous; the independence or union of the carpels in all their extent, or only in the ovary; the number of the ovules, their direction and that of their various parts, their anatropy, more or less complete, or almost nil.[5] The consistence and mode of dehiscence of the pericarp, the presence or absence of albumen in the seeds, and the straight or curved form of the embryo.

Almost all these genera belong to warm countries. This is the

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[1] Deducting those insufficiently known, or having been wrongly ascribed to this group, and which besides the doubtful types already considered are the following:—

1. *Pseudiosma* (DC., *Prodr.*, i. 718, n. 75;—A. Juss., in *Mém. Mus.*, xii. 519;—Endl., *Gen.*, n. 5981), proposed as *Diosma asiatica* Lour. (*Fl. Coch.*, 200), a plant excluded from the genus *Diosma* by De Candolle, unknown to us, and belonging perhaps to the genus *Evodia*.

2. *Huegelia* (R. Br., in *Flind. Voy.*, ii. 516;—Endl., *Gen.*, n. 6013), a plant with 10-merous perigynous calyx and corolla (which is perhaps a species of *Homalium* ?).

3. *Amblyorhinum* (Turcz., in *Bull. Mosc.* (1852), 168) wrongly cited (Walp., *Ann.*, vii. 506) among the *Rutaceæ*, is a species of *Valeriana*.

4. *Systemon* (Reg., *Ind. Sem. Hort. Petrop.* (1856), 38;—Walp., *Ann.*, vii. 505), which we have recognised from an authentic specimen for a species of *Heritiera*.

5. *Bouzelia* Montrous., in *Mém. Acad. Lyon*, x. 192.—B. H., *Gen.*, 989 (*Suriana* ?).

[2] Their structure, although so interesting, has not been much studied. [See Mirb., *Elém. de Physiol. Végét.*, t. 13, 1 (*Ailantus*);—Lindl., *Veg. Kingd.*, 479 (*Guaiacum*)]. Trécul has carefully studied the vessels proper of *Ailantus*, *Ptelea*, and *Brucea* (in *Comp. Rend. Acad. Sc.*, lxv. 17; in *Adansonia*, ix. 121).—Oliv., *Stem. Dicot.*, 9.

[3] Upon the value of these characters see *Adansonia*, x. 300.

[4] They are generally hypogynous; but when the floral receptacle becomes concave this arrangement is not very noticeable; it is, however, clearly defined in several *Boronias* and *Diosmas*.

[5] Several *Boronias* are almost completely anatropous, especially *Boronella* and *Zieridium* (see *Adansonia*, x. 302).

case with all the *Quassieæ*, *Cuspariеæ*, and *Auranticæ;* some are entirely American, others are Asiatic and Oceanian. We have seen that *Diosmeæ* is only found in South Africa, and *Boronieæ* in Oceania. *Zanthoxyleæ* is met with in all the warm regions; in the temperate regions we only observe a few species of *Zanthroxylon*, *Phellodendron*, which is found in North-east Asia, and *Ptelea*, a native of North America. *Suriana*, a plant found near the sea, has been met with on all the tropical sea-coasts. *Ruteæ* and *Zygophylleæ* often belong to cooler climates. Thus in Europe we meet with the genera *Ruta*, *Dictamnus*, *Tribulus*, *Zygophyllum*, *Fagonia*, and *Peganum*. The genus *Cneorum* is also represented there. Only six genera are common to the two Worlds; forty properly belong to the New World. The other genera belong especially to the Old, as do also all the *Diosmeæ*, *Boronieæ*, *Auranticæ*, *Balaniteæ*, *Cneoreæ*, and *Nitrarieæ*. The number of species hitherto described, and which may be considered as distinct, are about nine hundred and twenty, of which only two hundred and sixty are American; that is to say, more than two-thirds belong to the Old World.

The affinities of such a group must be many. By *Zygophylleæ* it is nearly allied to *Geranieæ*, from which *Zygophylleæ* only differ by the leaves, the absence of a fragrant oil, the mode of organization of the fruit, and the way in which the carpels of the *Geranieæ* separate at maturity from the central columella. The *Biebersteinieæ*, which have been really connected with the *Geraniaceæ*, are, on the other hand, closely allied to *Surianeæ;* they only differ by their entire and punctuate leaves, by the presence in each ovary of *Biebersteinia* of a single ovule, while there are two in *Suriana*, where they are, like the seeds, constructed in a peculiar manner. By *Suriana*, *Rutaceæ* is also closely connected with the *Ochnaceæ*, which are, as we have seen,[1] scarcely separable from *Quassiæ* and *Zanthoxyleæ*. We must search much further to find a connexion between the *Quassias* and the genus *Crossosoma*, which is an abnormal *Ranunculaceæ*, (?) but having the perianth, free carpels, and bitterness of *Quassia*, from which it only differs by its stamens, indefinite in number, and its arillate seeds; it is the same with the genus *Rigiostachys*, allied to *Ochnaceæ*, *Connaraceæ*, *Surinaceæ*, and *Rosaceæ*, with one of

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[1] See p. 365.

which it would perhaps be better to associate it.[1] The separation of *Rutaceæ* and *Burseraceæ* is quite artificial, and partly conventional. If the latter had not a resinous, balsamic sac, we could not distinguish them. It is also added, that the stamens are often inserted upon the disk, that they are never accompanied by scaly appendages nor hairs; but these characters are far from being absolute among the *Picramniæ*, which are not always bitter; this is why types like *Irvingia*, *Spathelia*, &c., may be equally well ascribed to either group. It is said, on the other side, that the *Burseræ* differ from the *Toddalieæ* by their exalbuminous embryo, diplostemonous androceum, and leaves destitute of glandular punctures; and from *Aurantieæ* by their style not articulate at the base, and their drupaceous fruit. But *Teclea*, nearly allied to *Toddalia* (to which it has even been ascribed), has seeds without any trace of albumen. *Balanites*, *Tariri*, *Picrodendron*, are also destitute of it; and in the genus *Irvingia* there is a species with an albuminous seed, and another with seed without perisperm. Many *Rutaceæ* of the *Quassia* series have neither hairs nor scales to the stamens; and in the genus *Limonia*, of the *Aurantieæ* series, we have plants with the style articulate at the base, and others (*Glycosmis*) where it is not so. We know, moreover, that there are true *Burseræ* with punctuate leaves. This latter character is found in certain *Meliaceæ*, also nearly allied to *Rutaceæ*,[2] and especially to the *Aurantieæ* series; but it is easy to distinguish practically, those *Meliaceæ* having monadelphous filaments united into a long tube. No hesitation would be possible except for the *Cedreleæ*, distinguished by their ovules, always numerous, succeeded by compressed seeds, and by their capsular fruit, septifragal or loculicidal, with valves separating from a central columella.

The properties[3] of the *Rutaceæ* differ according as they are bitter or glandular-punctuate. In the latter case, they are generally fragrant, stimulant, and sometimes even dangerous to some degree. This is decidedly the case in the Rues themselves, and principally

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[1] *Quillaja*, belonging to *Rosaceæ*, has been ascribed to *Rutaceæ*, under the name of *Fontenellea* A. S. H. (vol. i. 460).

[2] Bentham & Hooker (*Gen.*, 328) say of Meliaceæ: "Ordo *Rutaceis* proxime affinis, quibus per *Flindersiam* transitus facilis est; differt præcipue tubo staminco crasso foliisque rarissime punctatis."

[3] Endl., *Enchirid.*, 547, 606.—Guib., *Drog. Simpl.*, ed. 6, iii. 541.—Lindl., *Fl. Med.*, 207.—Duch., *Rep.*, 221.—Rosenth., *Syn. Pl. Diaphor.*, 755, 860, 884, 1157.

in the common Rue[1] (figs. 391–397), which is irritant, rubefacient, and venomous in certain quantities, and especially celebrated as an emmenagogue and abortive. Its seeds are said to be sudorific, antispasmodic, anthelmintic, and antidotal.[2] The same properties are found in most species of the genus *R. angustifola,*[3] *bracteosa* ;[4] they are more decided still in *R. montana,*[5] contact with which inflames the skin, and when applied to the head producing a pustular eruption resembling erysipelas. *R. tuberculata,*[6] of Nubia, whose odour is nearly like that of our Rues, is used by the Egyptian women in preparing a watery decoction said to make the hair grow. The odour of the *Boronieæ* is often very strong, but still more aromatic. Several of them are also used in Australia, in preparing digestive infusions analogous to tea.[7] The *Diosmas* of the Cape are also very aromatic. The most common are those which furnish *Buchu, Bucco,* or *Bocco*[8] of this country, employed as tonics, stimulants, diaphoretics, and diuretics: these are principally the *Barosmas,*[9] especially *B. crenulata,*[10] *crenata, serratifolia,*[11] *odorata,*[12] *betulina,*[13] and *pulchella.*[14] *Empleurum serrulatum,*[15] of the same country, gives also a sort of *Buchu long ;* and there are many other aromatic *Diosmas,* which are used in these regions in the preparation of digestive stimulant drinks, especially *Adenandra fragrans,*[16] *Agathosma,*[17] *micro-*

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[1] L., *Spec.*, 548 (part.). — DC., *Prodr.*, i. 710, n. 3.—Guib., *op. cit.*, 550, fig. 725.—Lindl., *Fl. Med.*, 210.—Rév., in *Fl. Med. du* xix^e *Siècle*, iii. 246, t. 24.—*R. hortensis* Mill., *Dict.*, n. 1.—Duham., *Arbr.*, ii. t. 61.

[2] The Rues are also used in the preparation of an essential oil, and in the fabrication of a vinegar called *quatre voleurs* (four thieves). *Rutine* has been named as one of its active principles. In spite of its irritant properties it is said to be eaten in salads in Italy and Greece.

[3] Pers., *Syn.*, i. 464.—DC., *Prodr.*, n. 6.—*R. graveolens a.* L., *Spec.*, 548.—*R. chalepensis* L., *Mantiss.*, 69 (part.). — Mor., *Ox.*, t. 35, fig. 8.—Sims, in *Bot. Mag.*, t. 2311.

[4] DC., *Prodr.*, n. 4.—*R. chalepensis tenuifolia* d'Urv., *Enum.*, 44.

[5] Clus., *Hist.*, ii 136.—DC., *Prodr.*, n. 2.—*R. sylvestris* Mill., *Dict.*, n. 3.—*R. legitima* Jacq., *Ic. Rar.*, i. t. 76.—*R. tenuifolia* Desf., *Fl. Atl.*, i. 336.

[6] Forsk., *Æg.-Arab.*, 86.—DC., *Prodr.*, n. 14.—*Haplophyllum tuberculatum* A. Juss.

[7] *C. alba* Andr., *spinosa* Andr., *virens* Sm. (see Rosenth., *op. cit.*, 880).

[8] Guib., *Drog., Simpl.*, ed. 6, iii. 551. — G. Pl., in *Dict. Encycl. Sc. Méd.*, xi. 280.

[9] See H. Bn., in *Dict. Encycl. Sc. Méd.*, viii. 380.—Rosenth., *op. cit.*, 881.

[10] Hook., in *Bot. Mag.*, t. 3113.—Harv. & Sond., *Fl. Cap.*, i. 393, n. 2.—*B. crenata* Kze. — *Diosma crenulata* L., *Amœn.*, iv. 308. — *D. crenata* L., *Spec.*, 287.

[11] W., *Enum.*, 257.—Harv. & Sond., *loc. cit.*, n. 1.—*Diosma serratifolia* Curt., in *Bot. Mag.*, t. 456.—*Parapetalifera serrata* Wendl., *Coll.*, i. 92, t. 31.

[12] Var. of *B. crenulata* (Harv. & Sond., *loc. cit.*).

[13] Bartl. & Wendl., *Coll.*, 102.—*Bucco betulina* Rœm. & Sch.

[14] Bartl. & Wendl., *loc. cit.*, 107.—*Diosma pulchella* L., *Spec.*, 288.—*Bot. Mag.*, t. 1357.

[15] Ait., *Hort. Kew.*, ed. 1, iii. 340.—Harv. & Sond., *Fl. Cap.*, ii. 442. — *Diosma ensata* Thunb., *Fl. Cap.*, 226.

[16] Rœm. & Sch., *loc. cit.*, 451. —Harv. & Sond., *Fl. Cap.*, i. 391.—H. Bn., in *Dict. Encycl. Sc. Méd.*, i. 694.—*Diosma fragrans* Sims, in *Bot. Mag.*, t. 1519.

[17] See H. Bn., in *Dict. Encycl. Sc. Méd.*, ii. 132.

phylla,[1] *chortophila*,[2] *Cerefolium*,[3] *Coleonema album* (figs. 416–420), *pulchrum*[4] (fig. 421), *juniperifolium*,[5] and *Diosma vulgaris*[6] and *succulenta*.[7] Our common *Dictamnus*[8] is also an aromatic stimulant, and tonic plant. So large is the quantity of volatile essence contained in the glandular reservoirs, that in warm weather it ignites when brought in contact with a lighted candle.[9] The *Zanthoxyleæ* are also essentially aromatic plants; but besides the essential oil, they contain a resin and a bitter crystalline principle, formerly called *xanthopicrite*,[10] which modifies their properties a little. *Zanthoxylum fraxineum*[11] (figs. 433–438) has a bark whose flavour, finally very acrid, excites salivation; it is employed as antirheumatismal, sudorific, and diuretic, and as a remedy for toothache. The bark of the yellow *Zanthoxylon Clava Herculis* (Fr., *Clavelier*) of the Antilles,[12] is more bitter and acrid; it recalls very much the *Angostura* bark, from which it differs especially by the presence of a certain yellow colouring matter, abounding in several species of the genus, which makes them prized as tinctorials. It has been recommended as a febrifuge and tonic. Most species of *Zanthoxylon* of the section *Fagara* are still more aromatic. Their bark, and particularly their fruits, have a burning, peppery taste, which makes them valued as spice. Such are *Z. carolinianum* Lamk., *heterophyllum* Lamk., *Avicennæ*

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[1] G. F. W. Mey., Bartl. & Wendl., *loc. cit.*, 173.—Harv. & Sond., *Fl. Cap.*, i. 423, n. 60.

[2] Eckl. & Zeyh., *Enum.*, 914.—Harv. & Sond., *Fl. Cap.*, i. 435, n. 90.—*A. cyminoides* Eckl. & Zeyh., *loc. cit.*, 916.

[3] Bartl. & Wendl., *loc. cit.*, 159.—Harv. & Sond., *Fl. Cap.*, i. 424, n. 62.—*A. Bartlingana* Eckl. & Zeyh., *Enum.*, 898 (part.).—*Diosma cerefolia* Vent., *Jard. Malmais.*, t. 93.—*Bucco cerefolium* Rœm. & Sch., *loc. cit.*, 439.

[4] Hook., in *Bot. Mag.*, t. 3340.—*C. gracile* Eckl. & Zeyh., *loc. cit.*, 833.—C. *virgatum* Eckl. & Zeyh.—*Diosma calycina* Steud.—*D. oppositifolia* E. Mey.

[5] Sond., *Fl. Cap.*, i. 378.—*Diosma juniperina* Spreng.—*D. Meyeriana* Steud.

[6] Schltl., in *Linnæa*, v. 201.—Harv. & Sond., *Fl. Cap.*, i. 374.—*D. hirsuta* L., *Spec.*, 286.—Thunb., *Fl. Cap.*, 223.—*D. oppositifolia* L., *Spec.*, 286.—*D. rubra* L., *Spec.*, 287.—*D. ericoides* Sims, in *Bot. Mag.*, t. 2332.

[7] Berg., *Pl. Cap.*, 63.—Thunb., *Fl. Cap.*, 224.—*D. scabra*, Lamk., *Dict.*, ii. 283.—*D. decussata* Lamk., *loc. cit.*, 284.

[8] See p. 383, note 1.—Endl., *Enchirid.*, 613.—Guib., *Drog. Simpl.*, éd. 6, iii. 553, fig. 727.—Rosenth., *Syn. Pl. Diaph.*, 882 (vulg. *Fraxinelle, Dictamne blanc, D. pourpre, Herba Fraxinellæ pumilæ* Off.).

[9] Biot, *Sur l'inflammat. de la Fraxinelle* (in *Nouv. Ann. Mus.*, i. 273). This essence gives its fragrance to a distilled water used in southern countries as a cosmetic. It has been employed in most affections of the nerves, hysteria, epilepsy, melancholy, &c. The root, stripped of its white, rolled bark, forms part of several drugs, especially Guttate powder. In Siberia, the leaves are used in preparing a stimulating infusion similar to tea.

[10] This substance has been recognised as identical with berberine. (Dyson-Perrins, in *Trans. Chem. Soc.* (1862), ex *Pharm. Journ.*, ser. 2, iv. 403).

[11] See p. 396, note 1. Guib., *Drog. Simpl.*, éd. 6, iii. 559.—Bigel., *Med. Bot.*, iii. t. 59.—Lindl., *Fl. Med.*, 216.—Bentl., in *Pharm. Journ.*, iv. 494. (Vulg. *Bois. épineux jaune, Prickly Ash, Toothache Tree*, of America.

[12] *Z. caribæum* Lamk., *Dict.*, ii. 40 (nec Gærtn.). — Descourt., *Fl. Ant.*, ii. 58. — ? *Z. carolinianum* Gærtn., *Fruct.*, i. 333, t. 68.—*Z. Clava Herculis* DC., *Prodr.*, i. 727 (nec L.).—Lindl., *Fl. Med.*, 216.—*Z. Elephantiasis* Macfad., *Jam.*, i. 193.

DC., *Pterota* K. In Eastern Asia several species are used as condiments and drugs. *Z. piperitum*,[1] of Japan, has in all its parts the warm, pungent flavour of *Anacylus Pyrethrum*. Several Chinese species bear the significant name of *Hoatsiao* (Pepper-flower).[2] *Z. alatum*,[3] and *zeylanicum*[4] are also prized as bitter and aromatic. *Z. Rhetsa*,[5] from the mountains of India, has bitter, pungent inner bark; the fruits are used in the same way as black pepper. *Z. Budrunga*,[6] of India, is also recommended as digestive, stomachic, and stimulant. In America several other species enjoy an analogous reputation. *Z. hyemale*[7] and *Langsdorffi*,[8] of Brazil, have an aromatic bitter bark; the former is copiously employed in powder as a remedy for ear affections, and ophthalmia. *Z. ternatum*,[9] of the Antilles, whose bark has sometimes been substituted for that of the *Geoffreæ* of the same country, is reputed astringent, vulnerary, antirheumatical, and antisyphilitic. *Z. emarginatum*,[10] of the same country, has a close hard wood, the odour of which is aromatic, as are all other parts of the plant. It is one of the Rose-woods or Rhodes-woods which come to us from America. *Z. senegalense*[11] is also considered as aromatic, sudorific, and stimulant. The same properties are found to a high degree in the different varieties of *Toddalia asiatica*,[12] especially those named *aculeata*[13] and *inermis*,[14] and which, under the common name of *Pied-de-poule*[15] (Hen's-foot), are used in India and the Mascareigne Islands as a bitter pungent stomachic drug and condiment, and as a febrifuge. The *Evodias* are analogous by their qualities to the preceding genera.

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[1] DC., *Prodr.*, n. 10. — Lindl., *Fl. Med.*, 217. — Rosenth., *op. cit.*, 875. — Kæmpf., *Amœn.*, t. 893.—*Fagara piperita* L., *Spec.*, 172 (vulg. *Seo*, *Sansjo* des Jap., *Peppel-mool Baccæ Fagaræ* s. *Piper japonicum* Off.).

[2] DC., *Prodr.*, n. 36.—Rosenth., *op. cit.*, 874.— ? *Fagara piperita* Lour.

[3] Roxb., *Fl. Ind.*, iii. 768. — Lindl., *Fl. Med.*, 217.—Hanbury, in *Pharm. Journ.*, sér. 2, ii. 554.—*Z. hastile* Wall.

[4] DC., *Prodr.*, n. 42.—Rosenth, *op. cit.*, 874.—*Fagara Lunu ankenda* Gærtn., *Fruct.*, i. 334, t. 68 (ex DC.).

[5] DC., *loc. cit.*, n. 38.—Rosenth., *op. cit.*, 875.—*Fagara Rhetsa* Roxb., *Fl. Ind.*, 438.

[6] DC., *loc. cit.*, n. 41.—Rosenth., *op. cit.*, 876.—*Fagara Budrunga* Roxb., *Fl. Ind.*, i. 437.

[7] A. S. H., *Pl. Us. Bras.*, n. 37 (vulg. *Coentrillo*).— ? *X. Culantrillo* H. B. K., *Nov. Gen. et Spec.*, vi. 2.—Tr., in *Ann. Sc. Nat.*, sér. 5, xiv. 312.

[8] Mart., ex Rosenth., *op. cit.*, 876 (vulg. *Tembetaru*).

[9] Sw., *Fl. Ind. Occ.*, i. 570.—Endl., *Enchirid.*, 610. — *Fagara ternata* Sw., *Prodr. Fl. Ind. Occ.*, 33.

[10] Sw., *Fl. Ind. Occ.*, i. 572.—DC., *Prodr.*, *loc. cit.*, n. 18. — Rosenth., *op. cit.*, 875 (*Lignum Rorum* v. *L. Rhodium* Jam.).

[11] DC., *Prodr.*, n. 14. — ? *Z. polygamum* Schum. & Thönn., *Beskr.*, 433.—*Fagara zanthoxyloides* Lamk., *Dict.*, ii. 446.

[12] *Paullinia asiatica* L., *Spec.*, 524.

[13] Pers., *Enchirid.*, i. 249.—DC., *Prodr.*, ii. 83.—Rosenth., *op. cit.*, 876.

[14] *Vepris inermis* Commers., herb. — A. Juss. in *Mém. Mus.*, xii. 509, t. 26, fig. 41. —? *Toddalia paniculata* Lamk., *Ill.*, t. 13, fig. 2.

[15] We may possibly ascribe to this plant the origin of the *racine de Jean Lopez* (*root of John Lopez*) (Guib., *Drog. Simpl.*, éd. 6, iii. 560).

E. hortensis,[1] in Polynesia, and *E. latifolia*,[2] in the Moluccas, serve as tonics and vulneraries. It is said that the fruit of *E. rutæcarpa*[3] is purgative. Several species of *Acronychia*,[4] particularly *A. pedunculata*,[5] are used in Asia and tropical Oceania as aromatic, tonic antirheumatical drugs. *Ptelea trifoliata*[6] (figs. 445, 446), a shrub of N. America, frequently cultivated in Europe, has leaves which, when bruised, give a strong, not very agreeable, odour; they pass as vermicidal, and are used in the treatment of ulcers of a bad nature. The fruits have an aromatic, bitter flavour; they are sometimes substituted for hops in making beer, but not without danger.

The *Cuspariæ* series contains a good number of species used as bitter tonic drugs and as febrifuges in their native country, which is Equinoctial America. The most celebrated is that furnishing the true Angostura bark, which ought to take the name of *Galipea febrifuga*.[7] This fragrant bark, greyish or yellowish outwardly, more or less fawn-coloured within, contains a bitter crystallizable principle (*cusparin*); it has been compared, on account of its properties, to the cinchonas, and is perhaps as good a stomachic and digestive as they, but very inferior as a febrifuge. *Ticorea febrifuga*[8] and *jasminiflora*[9] (figs. 409–413), *Hortia brasiliana*,[10] *Monniera trifolia*,[11] and *Esenbeckia*

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[1] Forst., *Char. Gen.*, t. 7.—Rosenth., *op. cit.*, 879.—*Fagara Evodia* L. fil.

[2] DC., *Prodr.*, i. 725, n. 1.—*Ampacus latifolia* Rumph., *Herb. Amboin.*, ii. 186.

[3] *Boymia rutæcarpa* A. Juss., in *Mém. Mus.*, xii. 507, t. 25, fig. 39.—Sieb. & Zucc., *Fl. Jap.*, i. 50, t. 21.—Rosenth., *op. cit.*, 876 (vulg. *Go-sju-ju*).

[4] Ainsl., *Mat. Med. Ind.*, ii. 306.—Rosenth., *op. cit.*, 877.

[5] *Cyminosma pedunculata* DC., *Prodr.*, i. 722.—*Jambolifera* L., *Fl. Zeyl.*, 58.—J. *pedunculata* Vahl, *Symb.*, 52, t. 61.—*Perinpanel* Rheed., *Hort. Malab.*, v. 15 ?—Gærtn., *Fruct.*, i. 281, not. (vulg. *Jambolanen, Jambobohnen*).

[6] L., *Spec.*, 173.—Dill., *Elth.*, t. 122.—Mill., *Icon.*, t. 211.—DC., *Prodr.*, ii. 82.—Duham., *Arbr.*, t. 43.—Turp., in *Dict. Sc. Nat.*, Atl., t. 128.—Lindl., *Fl. Med.*, 215.—Rosenth., *op. cit.*, 877.—Bentl., in *Pharm. Journ.*, iv. 498 (vulg. *Orme à trois feuilles, O. de Samarie, Trèfle de Virginie*). *P. pentaphylla* Mœnch (*Haus.*, iii. 242), a variety of the preceding, has the same properties.

[7] *G. Cusparia* A. S. H. (ex DC., *Prodr.*, i. (1824), 731); *Fl. Bras. Mer.*, i. 87.—Mer. & Del., *Dict. Mat. Méd.*, i. 300; vii. 46.—Pereira, *Elem. Mat. Med.*, ed. 4, ii. p. ii. 401.—Guib., *Drog. Simpl.*, éd. 6, iii. 535, fig. 728.—H. Bn., in *Dict. Encycl. Sc. Méd.*, v. 124.—*Cusparia febrifuga* H. B., *Tabl. Géogr.*, (1799).—*Bonplandia trifoliata* W., in *Act. Berol.* (1802), 24.—*Angostura Cuspare* Rœm. & Sch., *Syst.*, iv. (1819), 188. *G. officinalis* (Hanc., in *Trans. Med.-Bot. Soc.* (1829), 25, t. 2;—Lindl., *loc. cit.*, 211), furnishing the Angostura bark, and which I believe to have seen, seems nothing else but a form or variety of the preceding plant.

[8] A. S. H., *Pl. Rem. Brés.*, 142.—Lindl., *Fl. Med.*, 212.—Guib., *loc. cit*, 557 (vulg. *Tres folhas brancas*).

[9] A. S. H., in *Bull. Soc. Phil.* (1823), 132; *Pl. Rem. Brés.*, 141, t. 14.—Lindl., *Fl. Med.*, 212.—Rosenth., *op. cit.*, 879. A decoction of the leaves of this plant is considered in Brazil as a cure for the affection called *Frambœsia*, or *Babas* by the Portuguese.

[10] Vandell., in *Rœm. Script. Bras.*, 188.—DC., *Prodr.*, i. 732.—Rosenth., *op. cit.*, 880 (vulg. *Quina do campo*).

[11] L., *Spec.*, 986.—Aubl., *Guian.*, 730, t. 293.—DC., *Prodr.*, i. 730.—Rosenth., *op. cit.*, 879.—*Jaborandi* Marcgr., *Bras.*, 36 (vulg. *Alfavaca de cobra*). Also used as a diuretic and expectorant.

febrifuga,[1] are also used in Brazil as substitutes for the true Angostura or cinchonas.

The bitterness becomes more decided and noticeable in the Quassias. *Quassia amara*[2] (figs. 464–467), or *Bois de Surinam*, is perhaps the best known of all the bitter drugs in common use; it owes its numerous properties as a tonic, aperient, febrifuge, antihysteric, &c., to a crystallizable principle named *quassine*.[3] The stem is not large enough to be used in making those goblets which cause water placed in them to become bitter after a short time; these are made from the larger trunk of *Picræna excelsa*[4] (fig. 472), which has the same properties. The wood, and particularly the bark of the fibrous and greyish root of *Simaruba officinalis*,[5] a native of Guiana and the Antilles, are used as a bitter, tonic, antidysenteric, and as a febrifuge. In Brazil, *S. versicolor*,[6] *Quassia suaveolens*, *floribunda*,[7] and *ferrugina*;[8] in India and the Mascareigne Islands *Samandura* is used for exactly the same purposes.[9] *Q. Cedron*[10] (fig. 468) is principally valued in its native country, that is to say Columbia,

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[1] Mart., *Nov. Gen. et Spec.*, t. 233. — Rosenth., *op. cit.*, 880. — *Evodia febrifuga* A. S. H., in *Bull. Soc. Phil.* (1823), 129; *Fl. Us. Bras.*, n. 4; *Pl. Rem. Brés.*, i. 149; *Fl. Bras. Mer.*, i. 79.—DC., *Prodr.*, i. 724, n. 5.—Lindl., *Fl. Med.*, 210 (vulg. *Tres folhas vermellas*, *Laranjerio do Mato*). It furnishes the Angostura bark of Brazil, or *China Piaoi*.

[2] L. fil., *Suppl.*, 235; *Amœn. Acad.*, vi. 421, t. 4.—Lodd., *Bot. Cab.*, t. 172.—Lindl., *Fl. Med.*, 207.—Guib., *Drog. Simpl.*, éd. 6, iii. 561, fig. 729.—Turp., in *Dict. Sc. Nat.*, Atl., t. 125.—Rosenth., *Syn. Pl. Diaph.*, 870. —Rév., in *Bot. Med. du* xix^e^ *Siècle*, iii. 154, t. 153.—Moq., *Bot. Méd.*, 13.—Berg. & Schm., *Off. Gew.*, ii. t. 11 *d.* — H. Bn., in *Dict. Encycl. Sc. Méd.*, sér. 3, i. (*Quina de Cayenne*, *Bois amer*).

[3] Or *quassite* ($C^{20}H^{12}O^6$).

[4] Lindl., *Fl. Med.*, 208. — Guib., *Drog. Simpl.*, éd. 6, iii. 563.—*Quassia excelsa* Sw., in *Act. Holm.* (1788), 302, t. 8.—*Q. polygama* Wright (ex DC., *Prodr.*, i. 733).—*Simaruba*? *excelsa* DC., in *Ann. Mus.*, xvii. 323.—*Picrasma*? *excelsa* Pl., in *Hook. Lond. Journ.*, v. 574.—*Bittera febrifuga* Belang. (ex. Guib., *loc. cit.*). — Rosenth., *op. cit.*, 873 (*Bois de Quassia jaune*, *Q. de la Jamaïque*, *Bitter Ash*).

[5] *Simaba amara* Aubl., *Guian.*, 860, t. 331, 332.—Lindl., *Fl. Med.*, 207. — *S. officinalis* DC., in. *Ann. Mus.*, *loc. cit.*, n. 1; *Prodr.*, i. 733, n. 1.—Guib., *Drog. Simpl.*, éd. 6, iii. 563, fig. 730.—Macfad., *Jam.*, i. 198.—Mcq., *Bot. Med.*, 70, fig. 20.—*S. guianensis* Rich. (ex Rosenth., *op. cit.*, 871).—*Quassia Simaruba* L., *Suppl.*, 234.—Lamk., *Ill.*, t. 343, fig. 2. *S. amara* Hayn. (*S. medicinalis* Endl. — *Quassia Simaruba* Wright, nec L.), yielding the *Simaruba* root in Jamaica, has been specifically distinguished from the preceding, perhaps wrongly. The autonomy of *S. glauca* (DC., *loc. cit.*, n. 2) is also doubtful. The properties are always absolutely the same.

[6] A. S. H., *Pl. Us. Bras.*, n. 5; *Fl. Bras. Mer.*, i. 70. — Rosenth., *op. cit.*, 871. — *Quassia versicolor* Spreng. (*cortex* et *folia Paraibæ* Off.) Is this species really distinct from *Simaba amara* Aubl.?

[7] *Simaba suaveolens* et *floribunda* A. S. H., in *Bull. Soc. Phil.* (1823), 129.—DC., *Prodr.*, i. 734, n. 4, 5.—Rosenth., *op. cit.*, 872.

[8] *Simaba ferruginea* A. S. H., *loc. cit.* — Rosenth., *op. cit.*, 872. — *Picrodendron Calunga* Mart. (*Calunga*).

[9] Especially *S. indica* (*Samannera indica* Gærtn.;— *Nicta pentapetala* Lamk.;—*Wittmannia elliptica* Vahl) *madagascariensis* (A. Juss. *Mém. Rutac.*, t. 27, fig. 46;—*Biporeia* Dup.-Th., *Gen. Nov. Madag.*, 14;—*Nicta tetrapetala* Lamk.), plants as bitter as *Quassia*. The Picrasmas have the same properties, especially *P. javanica* Bl.

[10] H. Bn., in *Dict. Encycl. Sc. Méd.*, xiii. 539; in *Adansonia*, x. 317.—*Simaba Cedron* Pl., in *Hook. Kew Journ.*, ii. 566.—Seem., *Voy. Her. Bot.*, 95.—Guib., *Drog. Simpl.*, éd. 6, iii. 564.—Rosenth., *op. cit.*, 872.

Venezuela, Costa Rica, and in the north of Brazil, as a febrifuge and alexipharmic. The powder of the cotyledons, known under the name of *Noix de Cedron* (Cedron Nut), and which is sometimes sold at a high price, is used in treating the bites of serpents. Some consider it an invaluable specific in this case,[1] while others deny that it has any such virtues. It seems certain that in alleviating attacks of fever it is much inferior to cinchona, and is only useful as a tonic, like the other *Quassieæ* and *Simarubeæ*. *Brucea antidysenterica*[2] (fig. 437), an Abyssinian species, and *B. sumatrana*,[3] are also powerful tonics and bitters. The *Tariris* are the same in Tropical America. *T. pentandra*[4] of Jamaica has been extolled as a stomachic and febrifuge. *T. ciliata*[5] of Brazil has been used in the same way as cinchona and cascarilla. *T. Antidesma*[6] is used in Cuba as astringent and antisyphilitic. All these plants have a very bitter bark, less so however than *Rex amarosis* of Rumphius,[7] an excellent tonic, valued as a remedy in diarrhœa, fever, and cholera, and which is *Soulamea amara*[8] (figs. 491, 492); we may doubtless observe the same qualities in the numerous species of the genus found in New Caledonia.[9] *Castela Nicholsoni*[10] passes in the Antilles as being as bitter as *Quassia*. In *Ailantus*[11] the bitterness is less decided, especially in the leaves, and gives place to a nauseous flavour. *A. glandulosa*[12] (figs. 469–471), a native of Temperate Asia, introduced into Europe in 1751 by P. d'Incarville, now cultivated in many countries, where it is very

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[1] Hook., in *Pharm. Journ.*, x. 344.—Saffray, in *Tour du Monde*, xxiv. 10.—Tr., in *Ann. Sc. Nat.*, sér. 5, xv. 357.

[2] Mill., *Fasc.*, t. 25.—DC., *Prodr.*, ii. 88, n. 1.—Lindl., *Fl. Med.*, 219.—Rosenth., *op. cit.*, 873.—H. Bn., in *Dict. Encycl. Sc. Nat.*, xi. 174.—*B. ferruginea* Lhér., *Stirp.*, 19, t. 10. — *Wooginos* Bruce, *Voy.* (trad. Castera), v. 87, t. 43.

[3] Roxb., *Fl. Ind.*, i. 469.—DC., *Prodr.*, n. 3. —H. Bn., *loc. cit.*, n. 2.—*Genus amarissimus* Lour. — *Simaba quassioides* (Don, *Prodr. Fl. Nepal.*, 218), which is *Nima quassioides* Ham., and which in mountainous India is thought to be as powerful a bitter as *Quassia*. (Royle, *Essay*, 8;—Lindl., *Fl. Med.*, 209), belong also to the genus *Brucea*.

[4] *Picramnia pentandra* Sw., *Fl. Ind. Occ.*, i. 220.—Pl., in *Hook. Journ.*, v. 377.—Rosenth., *op. cit.*, 867. An infusion of this plant is, according to De La Sagra, used in Cuba in preference to quinine and cinchona in the treatment of intermittent fevers.

[5] *Picramnia ciliata* Mart. ex Rosenth., *loc. cit.* (vulg. *Pao Pereira*).

[6] *P. Antidesma* Sw., *Fl. Ind. Occ.*, *loc. cit.*

[7] *Herb. Amboin.*, ii. 129, t. 41.

[8] Lamk., *Dict.*, i. 449. — DC., *Prodr.*, i. 335.—Lindl., *Fl. Med.*, 127.—Rosenth., *op. cit.*, 790.—*Cardiocarpous amarus* Reinw., *Syll. Pl. Ratisb.*, ii. 14. — *Cardiophora Hindsii* Benth., in *Hook. Lond. Journ.*, ii. 216.

[9] Ad. Br. & Gr., in *Ann. Sc. Nat.*, sér. 5, iii. 229.

[10] Hook., in *Bot. Misc.*, i. t. 56.—Rosenth., *op. cit.*, 869 (vulg. *Goat Bush*).

[11] See H. Bn., in *Dict. Encycl. Sc. Méd.*, ii. 226.

[12] *Ailantus glandulosa* Desf., in *Act. Acad. Par.* (1786), 263, t. 8.—Lhér., *Stirp.*, t. 84.—DC., *Prodr.*, i. 89. — Rosenth., *Syn. Pl. Diaph.*, 877.—*A. procera* Salisb., *Prodr.*, 271. —*Rhus hypsolodendron* Mœnch. — *R. Cacodendron* Ehrh. — *R. canadense* Mill. (vulg. *Ailanto, Faux Vernis du Japon*).

useful in plantations and replanting, on account of the facility with which it grows in the most ungrateful soil, is used in feeding a butterfly[1] which produces a textile silk less brilliant but stronger than that of the silkworm. The leaves of this tree are irritant; those who touch them may be attacked by vesicular or pustular eruptions, caused by an acrid volatile substance. They have been tried, as has also the powdered bark, as vermicides; they kill ascarides, but are of little use against teniæ; they moreover cause violent colic, and treated with ether give a resinous vesicatory substance. In India, *A. excelsa*[2] and *malabarica*[3] have a bark used as a bitter and aromatic; it is administered in intermittent fever. The fruits of the latter are recommended in severe cases of headache and stomach affections.

Among the *Zygophylleæ* the *Guaiacums* have long been the most famous of sudorific, antirheumatical, and antisyphilitic woods. Two species are especially employed: *Guaiacum sanctum* (fig. 514) and *G. officinale*.[4] The latter is now most used. It is a beautiful tree with blue flowers, from the Antilles, principally Cuba, Jamaica, St. Lucia, and neighbouring parts of the mainland. The wood reaches us in large logs, sometimes covered with bark, much heavier than water, formed of a yellow sapwood and brown heart, very compact, with the layers alternately directed from right to left. Its transverse section shows close radiating stripes traversed by vascular openings full of a greenish resin; the powder is balsamic, pungent, choking, and becomes green when in contact with the air and light. There is in commerce a wood with irregular layers, and another with an odour like vanilla. The bark is also met with sometimes; it contains, like the wood but in very different proportions, several acids, gum, mineral substances, and especially a greenish-brown resin with a slight odour of benzine and a pungent flavour, much used in the same way as the wood itself; the resin of the bark is different from that of the wood.[5] *G. sanctum*[6] is fre-

[1] *Bombyx Cynthia.*

[2] Roxb., *Pl. Coromand.*, i. t. 23.

[3] DC., *Prodr.*, ii. 89, n. 4. — *Pongelion* Rheed., *Hort. Malab.*, vi. t. 15.

[4] L., *Spec.*, 546. — Lamk., *Ill.*, t. 342.—Blackw., *Herb.*, t. 350.—Sloan., *Hist.*, t. 222, fig. 3. — Sw., *Obs.*, 168. — Macfad., *Jam.*, i. 187.—Endl., *Enchirid.*, 617.—Guib., *Drog. Simpl.*, éd. 6, iii. 543, fig. 724.—Nees, *Pl. Off.*, t. 380.—Lindl., *Fl. Med.*, 214.—Rév., in *Fl. Méd. du* xix^e^ *Siècle*, iii. 79, t. 8.—Moq., *Bot. Méd.*, 152, fig. 49. — Rosenth., *Syn. Pl. Diaphor.*, 886.—Berg. & Schm., *Off. Gew.*, ii. t. 14, *b* (vulg. *Jasmin d'Amérique, d'Afrique, Lignum vitæ* Off.).

[5] See Guib., *loc. cit.*, 545.—Flückig., *Pharmacog.*, 68. The acids are called guaiacic, guaiaconic and resino-guaiacic. The extractive bitter principle is called *guaiacin.*

[6] L., *Spec.*, 546.—DC., *Prodr.*, n. 4.—Guib.,

quently called Guaiacum, with tetragonal fruits; it has often, in fact, four prominent cells (or three or five) in the fruit, while that of the other species is generally two-celled. It is found in the Antilles and Mexico; the wood is fawn-colour sprinkled with whitish punctures. It is much less used than that of *G. officinale;* we may say as much for the Gayacan of Caracas, a greenish, very acrid wood, furnished by *G. arboreum*,[1] and the Gayacan of Chili, the hard, blackish wood, with pale-yellow sapwood of *G. hygrometricum*.[2] The herbaceous *Zygophylleæ* of our hemisphere are really little used. However, the *Zygophyllum fabago*[3] (figs. 497–502) is yet noticed as an anthelmintic and antisyphilitic drug. The bruised leaves give a strong odour, and the buds are sometimes substituted for those of the Caper-plant. The Arabs reduce the leaves of *Z. simplex*[4] to powder, and use it in preparing a decoction, which they apply to the eyes as a remedy for film and specks. The plant is also vermicidal; its fetid odour repels cattle. The powdered seeds of *Z. coccineum*[5] are used by the Arabs in helminthic affections. At the Cape *Z. sessilifolium*[6] and *spinosum*[7] are employed. *Tribulus* is said to be astringent. The roots, leaves, and fruit of *T. terrestris*[8] (figs. 511–513) are esteemed in the South as aperients and tonics. In the Antilles the root of *T. cistoides*[9] is used in the same way. The leaves are applied in drawing abscesses. In India *T. lanuginosus*[10] is also prescribed as diuretic, and in Cuba *T. maximus*[11] for various cutaneous affections. *Fagonia arabica*[12] is used in the East in the

loc. cit., 547.—Rosenth., *op. cit.*, 887 (vulg. *Bois Saint, B. de vie*). The specific difference between this species and the preceding, resting on the number of the pairs of folioles, and that of the shells of the fruit, are subject to variations, and have not perhaps a very great value.

[1] DC., *Prodr.*, n. 5.—H. B. K., *Nov. Gen. et Spec.*, vii. 11.—Guib., *op. cit.*, 549.—*Zygophyllum arboreum* Jacq., *Amer.*, 130, t. 83.

[2] H. Bn., in *Adansonia*, x. 314.—*Porlieria hygrometrica* R. & Pav., *Syst.*, 94. — DC., *Prodr.*, i. 707.—Lindl., *Fl. Med.*, 215.—Guib., *op. cit.*, 549 (vulg. *Turucasa, Gaïac du Chili*). This plant is celebrated for the way in which its leaves close in dark dull weather. "Folia aperta aut clausa serenitatem et tempestatem denuntiant." (R. & Pav.)

[3] See p. 422, note 5. Lindl., *Fl. Med.*, 213.—Rosenth., *op. cit.*, 886.

[4] L., *Mantiss.*, 68.—*Z. portulacoides* Forsk., *Æg.-Arab.*, 88, t. 12.

[5] L., *Spec.*, 551.—Shaw, *Afr.*, f. 231.—*Z. desertorum* Forsk., *loc. cit.*, 87, t. 11.

[6] L., *Spec.*, 552. — Dill., *Elth.*, t. 116, fig. 142.—Burm., *Afr.*, 4, t. 2, fig. 1.

[7] L., *Mantiss.*, 380.—Burm., *op. cit.*, 5, t. 2, fig. 2.

[8] L., *Spec.*, 554.—Lamk., *Ill.*, t. 346.—Schkuhr., *Handb.*, t. 115.—Rosenth., *op. cit.*, 885 (vulg. *Herse, Herbe terrestre, Saligot terrestre, Croix de Malte, de chevalier*). According to Mérat & Delens (*Dict. Mat. Méd.*, i. 489), it is *Atrivolvo* of Belon.

[9] L., *Spec.*, 544.—Jacq., *Hort. Schœnbr.*, t. 103.—Pluk., *Almag.*, t. 67, fig. 4.—DC., *Prodr.*, i. 703, n. 1.

[10] L., *Spec.*, 553.—Burm., *Zeyl.*, 265, t. 106.—DC., *Prodr.*, n. 5.

[11] L., *Spec.*, 553.—Jacq., *Ic. Rar.*, t. 462.—Lamk., *Ill.*, t. 346, fig. 2.—DC., *Prodr.*, n. 6.—Rosenth., *op. cit.*, 885.—*Kallstrœmia maxima* W. & Arn.—*K. Tribulus* Meissn.

[12] L., *Spec.*, 553. — DC., *Prodr.*, i. 704, n. 3.—*F. mysorensis* Roth.

treatment of paralysis, spermatorrhœa, &c. *Peganum Harmala*[1] (figs. 506–510) is sudorific, anthelmintic, and an emmenagogue. Its odour is strong and disagreeable, and its flavour resinous-bitter and tenacious. In Persia it is used in fermentations for dropsy in the feet. The seeds are stimulating and intoxicating; they are used as condiments, and also furnish a red colour.[2] There are also some tinctorial *Rutaceæ*. The bark of *Samandura indica* serves, with that of *Morinda umbellata*, in preparing Indian muslins, and in dyeing them red. The *Zanthoxylons* owe their power of dyeing yellow to the presence of *xanthopicrite;* such are: especially *Z. fraxineum* (figs. 433–438), *carolinianum*, *Rhetsa*, &c. The *Coriarias* are almost all tinctorial plants, especially *Coriaria myrtifolia*[3] (figs. 521–525). The leaves, which have, it is said, been used in the adulteration of senna, and which are venomous, serve to dye black, and also to tan leather in Languedoc, and in North Africa. The fruits are also dangerous, although the fleshy perianth which accompanies them prompts man to eat them, and has, perhaps, been fraudulently used in colouring wine.[4] It is true that in New Zealand, *C. sarmentosa*,[5] the seeds of which are venomous, is valued for the fleshy part of its fruit, from which a much-esteemed intoxicating drink is made. There are also in those of *C. nepalensis*[6] a pulpous part which is eaten safely. At Quito the natives, who partake immoderately of those of *C. thymifolia*,[7] show at first all the phenomena of a delirious gaiety; but they finally succumb. In Chili, *C. ruscifolia*[8] is used in dyeing black. The fruits of *Balanites ægyptiaca*[9] (figs. 460–463) have pro-

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[1] L., *Spec.*, 638.—Lamk., *Ill.*, t. 401.—Bull., *Herb.*, t. 343.—DC., *Prodr.*, i. 712.—Rosenth., *op. cit.*, 883 (Μῶλυ v. Πήγανον ἄγορον Diosc.—Vulg. *Harmel, Armel*).

[2] Moq., upon a new pl. tinct. P. Harmala (in *Pol. Lit. Journ. H.-Garonne*, June, 1840, n. 82). *P. mexicanum* Gray, is used as a depurative.

[3] L., *Spec.*, 1467.—Lamk., *Ill.*, t. 822.—Duham., *Arbr.*, i. t. 73.—DC., *Prodr.*, i. 739, n. 1.—Turp., in *Dict. Sc. Nat.*, Atl., t. 288, 289.—Lindl., *Fl. Med.*, 223.—Guib., *Drog. Simpl.*, éd. 6, iii. 368, 596, fig. 670, 733.—Rév., in *Fl. Médic. du* xix^e^ *Siècle*, iii. 185.—Rosenth., *Syn. Pl. Diaphor.*, 774 (vulg., *Redon, Redoux, Corroyère, Herbe aux tanneurs, Sumac des teinturiers*).

[4] The active principle is *coryamyrtine* (Riban, in *Compt. Rend.*, Nov. 1863), glycoside crystallizable, very bitter, producing sickness, convulsions, and death, without directly irritating the mucus of the stomach, and without destroying the muscular contractility.

[5] Forst., *Prodr.*, 377 (vulg. *Tupa kihi*).

[6] Don, in *Wall. Pl. As. Rar.*, t. 289.

[7] H., in *W. Spec.*, iv. 819.—James, *On the Ink Plant of N.-Granada* (in *Journ. Linn. Soc.*, vii. 120).—*Heterocladus caracasan Us.* Turc., in *Bull. Mosc.* (1847), ii. 152.

[8] L., *Spec.*, 1467.—Feuill., *Per.*, iii. 17, t. 12.

[9] Del., *Fl. d'Eg.*, 77, t. 28, fig. 1.—DC., *Prodr.*, i. 708.—Guillem. & Perr., *Fl. Sen. Tent.*, i. 103.—Guib., *Drog. Simpl.*, éd. 6, iii. 287, 441.—Mér. & Del, *Dict. Mat. Méd.*, i. 111, 537; vi. 977; vii. 91.—Rosenth., *Syn. Pl. Diaphor.*, 755.—Oliv., *Fl. Trop. Afr.*, i. 315.—H. Bn., in *Dict. Encycl. Sc. Méd.*, viii. 276.—*Ximenia ægyptiaca* L., *Spec.*, 1194.—*X. ferox* Poir., *Dict.*, viii. 805.—*Agialid* P. Alp, *Æg.*, 29, t. 11. *B. Roxburghii* (Pl., in *Ann. Sc. Nat.*, sér. 4, ii. 258), an allied

perties varying according to their degree of maturity. Ripe, they are eaten in Egypt and Arabia under the name of Desert dates (*Dattes du désert*). They are then sweet, and by fermentation give an alcoholic intoxicating drink. At an earlier period they are pungent, bitter, and purgative. They were formerly named *Myrobalans d'Egypte*; their embryo furnishes a large quantity of peculiar oil. In the seeds of *Irvingia* is also found a particular kind of fat, obtained especially from a widely-spread species found on the western coast of tropical Africa, from Sierra Leone to Gaboon, *Irvingia gabonensis*,[1] and known under the name of Dika bread (*pain de Dika*). This is a brown mass, very similar to cocoa in colour, odour, and taste; it is formed of seed coarsely pounded, and made into a block of porphyritic appearance, on the bottom of which are whitish impressions. Nearly eight-tenths of it are constituted by a kind of Dika butter (*beurre de Dika*), which is separated by boiling in water, and is very similar in taste and smell to Cocoa butter.[2] *Cneorum* is also useful: *C. tricoccum*[3] (figs. 493–496) has bitter leaves, and juice purgative, drastic, antiseptic; *C. pulverulentum*,[4] of the Canaries, still more bitter, is a febrifuge, and its bark is said to be substituted for that of Cinchona. The *Skimmias* are slightly bitter and aromatic; the buds of *S. japonica*[5] are used in their native country to perfume tea.

But the most grateful essences met with in this family are collected in the glandular vesicles of most of the *Aurantieæ*.[6] The bitter principle is not quite absent, especially at a certain age, and we know how much it is developed in the young fruits of the Orange, Seville Orange, and Lemon trees, &c., with which alcoholic, tonic, aperient, stomachic, and even febrifugal drinks are prepared; or in the zests of their ripe fruits, which serve the same purpose. The rind of the common lemon[7] is bitter and stimulant; it is used in

species, or perhaps a variety of the preceding, a native of India, having the same properties.

[1] H. Bn., in *Adansonia*, viii. 95.—*I. Barteri* Hook. f., in *Trans. Linn. Soc.*, xxiii. (1860), 167.—Oliv., *Fl. Trop. Afr.*, i. 314.—Guib., *Drog. Simpl.*, éd. 6, iii. 566.—*Mangifera gabonensis* Aubr.-Lec., ex O'Rorke, in *Rep. Pharm.*, xxxi. (1858), 275 (vulg. *Oba*, *Iba* of Gaboon, *wild Mango* of the English colonies).

[2] Oudem., in *Journ. Prakt. Chem.*, lxxi. 356.

[3] L., *Spec.*, 49.—DC., *Prodr.*, ii. 84, n. 1.—Gren. & Godr., *Fl. de Fr.*, i. 341.—Rosenth., *Syn. Pl. Diaph.*, 869.—*Chamelæa tricoccos* Lamk., *Fl. Fr.*, ii. 682 (vulg. *Garoupe, petit Olivier*, *Olivier nain*).

[4] Vent., *Jard. de Cels.*, t. 77.—Webb, *Phyt. Canar.*, t. 66.

[5] Thunb., *Fl. Jap.*, 4; *Nov. Gen.*, 57.—Banks, *Ic. Kæmpf.*, t. 5. — *Ilex Skimmia* Spreng., *Syst.*, i. 495.

[6] Endl., *Enchirid.*, 549. — Lindl., *Fl. Med.*, 161; *Veg. Kingd.*, 458. — Rosenth., *Syn. Pl. Diaph.*, 755, 1150.—Guib., *Drog. Simpl.*, éd. 6, iii. 618.—H. Bn., *Aurant.*, 49.

[7] Fruit of *Citrus Medica Limon* Galles. (*Tr. Citrus* (1811), 105) or Lemon-tree, ac-

making theriac, Balm of Carmel (*Mélisse de Carmes*), and antiscorbutic syrup.[1] It has been used like the root as a febrifuge. Sweet and bitter syrup of orange-peel are excellent stomachics; they are often taken as vehicles of ioduret of potassium, and other drugs. These rinds were formerly considered as strengthening, and even aphrodisiac; they enter into the composition of various liqueurs, such as curaçoa, and different perfumes, such as essence of Portugal. The young fruits of the orange tree, or *Chinois*, are bitter, and prepared with sugar and spirits. *Feronia* and *Ægle* are considered in India and the neighbouring countries as powerful astringent drugs. At Malabar, *Æ. Marmelos*[2] is a kind of panacea. An infusion of its leaves is said to cure bronchitis and asthma; when pulverized they are a remedy for palpitations, melancholy, hypochondria; and the green fruits cure diarrhœa, dysentery, and cholera. The seeds, mixed in cement, give great firmness to buildings. The fruit is said to be excellent; a beautiful yellow dye is prepared from it, and an exquisite perfume is extracted from the pericarp. *Murraya Kœnigii*[3] is also a drug much esteemed in the treatment of affections of the digestive tube, especially in dysentery. An infusion of its leaves is prescribed for sickness, and stomach complaints. When reduced to powder they are, like the bark, administered as a tonic and stimulant; when fresh, they are served at table, and often enter into the composition of curries. *Murraya exotica*[4] is astringent and stimulant; its flowers are used in India in dyeing black. They give by distillation a perfumed essence. In *Feronia elephantum*,[5] the bruised leaf has a smell of aniseed, very agreeable, and much prized by the Indians. From its trunk flows a gum of fine quality. Essences of Neroli, extracted from the flowers of the Lemon tree, or more usually from those of certain Orange trees, are

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cording to the opinion of Guibourt (*Drog. Simpl.*, éd. 6, iii. 621), although it is generally wrongly named *C. medica*.

[1] The essence extracted enters into the manufacture of Eau de Cologne and several other perfumes.

[2] Corr., in *Trans. Linn. Soc.*, v. 222.—Roxb., *Pl. Coromand.*, ii. t. 143; *Fl. Ind.*, ii. 579.—DC., *Prodr.*, i. 538.—Lindl., *Fl. Med.*, 162.—H. Bn., *Aurant.*, 54, in *Dict. Enc. Sc. Méd.*, ii. 45.—Rosenth., *op. cit.*, 757.—*Cratæva Marmelos* L., *Spec.*, 637.—*Feronia pellucida* Roth, *Nov. Spec.*, 384 (vulg. *Bilva Mahura, Bael* of the Indians).

[3] *Bergera Kœnigii* L., *Mantiss.*, 565.—DC., *Prodr.*, i. 537, n. 1.—Roxb., *Pl. Coromand.*, ii. t. 112.—Wight & Arn., *Prodr.*, i. 94.—Lindl., *Fl. Med.*, 161.—H. Bn., *Aurant.*, 54; in *Dict. Encyl. Sc. Méd.*, ix. 127.

[4] L., *Mantiss.*, 563.—DC., *Prodr.*, i. 537.—H. Bn., *Aurant.*, 37.—*Chalcas japonica* Lour., *Fl. Cochinch.*, 332.—*Marsus buxifolia* Sonner., *Voy.*, ii. t. 139.

[5] Corr., in *Trans. Linn. Soc.*, v. 224.—Roxb., *Pl. Coromand.*, ii. t. 141.—DC., *Prodr.*, i. 538.—Endl., *Enchirid.*, 549.—Rosenth., *op. cit.*, 757.—Lindl., *Fl. Med.*, 161.—H. Bn., *Aurant.*, 54.—*Cratæva Valanga* Kœn. (Vulg. *Elephant Apple, Wood Apple, Capittha*).

known as some of the most grateful perfumes. The sweet Orange[1] (figs. 455–459), comprehending numerous cultivated varieties—such as Orange with red juice, with thick rind, with soft rind, with dwarf fruit, Chinese Orange, &c. &c., is not the plant which supplies medicine and industry with the products so well known under the name of *Orange leaves* and *flowers*, and with all the extracts, especially true Essence of Neroli, Orange flower-water, rind of bitter Oranges, Orangettes, or *petit grains* — that is to say, young fruits with which bitter digestive liqueurs are prepared, and often issue peas also. All these are derived from the Seville Orange (*Bigaradier*[2]), a tree with round head, young thorny shoots, of a pale green, leafed petioles much winged, globular fruits, rough zests of a reddish-yellow, very aromatic, with a thin white layer extremely bitter, and an acid but very bitter juice hindering this fruit from being edible, contrary to that of all the true oranges, which are scarcely used for any other purpose. *Citrus limetta*,[3] especially one of its forms, *Bergamia*,[4] has a fruit with a piriform, smooth, yellow pericarp, with very agreeable smell, and giving an excellent essence ; but the pulp is sharp and bitter, and, consequently, useless. The *Citron*[5] has large fruits, with rough tubercular surface, often mammillate towards the apex, violet before maturity, and of a fine yellow when ripe ; their peel is very thick, and is used in preparing a grateful essence, and also excellent conserves and sweetmeats. The Citron was probably the true *Apple of Media* of the Ancients ; and it is a mistake that this name should have been afterwards applied to the Lemon tree,[6] remarkable for its young angular, violet shoots, its oval leaves, with petiole naked or but slightly winged, and its flowers violet or red outwardly. Its fruit is elongated, and terminated by a prominent teat ; it is used in preparing syrup of lemon ; its yellow zest, which enters into the preparation of

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[1] *Citrus Aurantium sinense* Galles., *Trait.*, 119.—*C. Aurantium* Risso, in *Ann. Mus.*, xx. 181, t. 1.—DC., *Prodr.*, i. 539.

[2] *C. Aurantium indicum* Galles., *Trait.*, 122.—*C. Bigaradia* Duham., *Arbr.*, ed. 2, vii. 99. — Risso, *loc. cit.*, 190. — *C. Aurantium* Lindl., in *Bot. Reg.*, t. 346.

[3] *C. Limetta* Risso, *loc. cit.*, 195, t. 2, fig. 1.—Lindl., *Bot. Med.*, 163.

[4] *C. medica Limon aurantiata fructu parvo, suavissime odorato, vulgo* Bergamotto Galles., *Trait.*, 118. Was much used in perfumery. Formerly the elegant and *recherchés bonbonnières* called *bergamotes*, were made of the rind (Guib., *op. cit.*, 624).

[5] *C. medica Cedra* Galles., *Trait.*, 87 (*Citronnier*).—*C. cedra* Ferr., *Hesper.*, t. 59, 61, 63 (ex Guib., *op. cit.*, 620). It is also the *Citron* of the Jews, consecrated in the Temple.

[6] See p. 452, note 7. *C. medica Limon* Galles., *Trait.*, 105. — *C. Limonum* Risso, *loc. cit.*, 201.—Berg. & Schm., *Off. Gew.*, ii. t. 31 *f.*

several drugs, furnishes the Essence of Lemon by pressure or distillation. Its acid pulp is used in making a refreshing drink, and as a topical, exciting, antiputrid, hæmostatic drug; and from it also are extracted the citric acid used in commerce and medicine. The number of varieties and forms of the preceding species, more or less commonly used in industry and domestic economy, is also considerable.[1]

The properties of *Amyris*[2] more nearly approach those of *Burseraceæ*, to which this genus was long ascribed.[3] They are fragrant and balsamic, and are said to yield some resinous products. *A. sylvatica*,[4] of the Antilles, is an aromatic and stimulant plant. In the same regions, *A. balsamifera*,[5] whose fragrance is very balsamic, is considered venomous. The production of a kind of elemi is attributed to *A. Plumieri*;[6] and Hamilton names his *A. hexandra*[7] as furnishing the gum elemi of Nevis.[8] The wood of several species of *Amyris* is useful. That of *A. sylvatica* is the *Bois de Citron* (Lemon wood) of commerce. Its qualities are thus very similar to those of the beautiful wood of the *Auranteæ*,[9] so much used in fine cabinet work, especially that of the Citron; and also to that of the Lemon, which is close, scentless, pale yellow, and susceptible of being turned and polished like box, but is less beautiful than the latter; to that of the Seville Orange, tolerably hard, and of a greyish-white; and to that of the true Orange, which is white, without veins, and sometimes coloured red towards the centre. The wood of *Quassia* and *Picræna* employed as bitters, as we have seen, are susceptible of a fine polish, and may be used in cabinet work, although rather light. That of *Quassia* is a yellowish-white; the other is yellower, more fibrous, and less satin-like. These two woods are not attacked by insects,[10] and

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[1] See H. Bn., *Aurant.*, 53. Besides which, we value especially for their fruits the varieties of Citron called *C. de Salo*, of *Florence*, or *petit Poncire*; those of the Lemons called *Lustrat*, *Poncire d'Espagne*, Apple of Paradise, Sweet Lime, and Naples L.; those of Seville Orange called *Turquoise*, *small China*, *China Orange with myrtle leaves*, *Pompoleon* or Adam's Apple, Seville O. with violet fruit, *Mellarose*, *Bizarrerie*; those of the Sweet Orange, called *Portugal O.*, *China O.*, *Maltese*, or *Blood Orange*, *Pampelmousier* (*C. decumana* Auctt.), or *Chadok*, *Tangerine*, *Mandarine*, &c. In tropical Asia are eaten the small berries of several *Murrayas*, *Luvungas*, *Limonias*, especially those of *Glycosmis* and of *L. trifoliata* (fig. 454).

[2] See H. Bn., in *Dict. Encycl. Sc. Méd.*, iv. 49.

[3] Many *Burseraceæ*, with useful products, were formerly called *Amyris*, especially *Icica*, *Protium*, *Bursera*, *Balsamodendrum*.

[4] Jacq., *Amer.*, 107.

[5] L., *Spec.*, 496.—Sw., *Obs.*, 149.—*A. toxifera* W., *Spec.*, ii. 336.—*Lucinium* Pluk, *Almag.*, t. 201 (see Tr., in *Ann. Sc. Nat.*, sér. 5, xiv. 323).

[6] DC., *Prodr.*, ii. 81, n. 5. Probably a form of *A. sylvatica* (note 4).

[7] *Prodr. Fl. Ind. Occ.*, 34.

[8] Lindl., *Fl. Med.*, 277.

[9] See Guib., *op. cit.*, iii. 623.

[10] Preparations are made of them for killing flies, and we are assured they keep collections of herbs, &c., from attacks of insects.

remain long intact. That of *Ailantus*, especially after being soaked in water, is used by wheelwrights, cabinet-makers, and for firing, &c.[1] That of *Phellodendron*, porous and light, takes the place of cork on the banks of the Amour. The wood of several species of *Simaruba*, *Zanthoxylon*, *Ptelea*, *Esenbeckia*, *Coriaria*, *Casimiroa*,[2] are valued in America for industrial and domestic purposes. At the Cape, the wood of *Calodendron capense* is used in the same way. The hardest, heaviest, and best for cabinet work is certainly that of various species of *Guaiacum*, *G. officinale*, *sanctum*, *hygrometricum*, *arboreum*,[3] &c. Several *Rutaceæ* are ornamental: the *Aurantieæ*, cultivated for their foliage and fruits; the *Diosmeæ* and *Boronieæ*, valued in our greenhouses for their flowers; some *Cusparieæ* of the genera *Erythrochiton*, *Galipea*, *Almeidea*, *Ravenia*, ornamenting our hothouses; some species of *Ruta*, *Dictamnus*, *Harmala*, and *Fabago*, growing in the open air in France; *Ptelea*, *Phellodendron*, *Cneorum*, *Skimmia*, and some species of *Zanthoxylon*,[4] whose foliage embellishes our gardens; finally, the glandular *Ailantus*, so useful in industry and agriculture.

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[1] *A. imberbiflora* (F. Muell., *Fragm.*, iii. 42; — Benth., *Fl. Austral.*, i. 392) has a wood used in Australia. The branches of *Bouchardatia* are used by the blacks of the country in making lances.

[2] The fruits of *Casimiroa* are sold as edible in Mexico.

[3] Upon their characters and uses, as upon the wood of *Passiflora* (Fr. *Grenadille*), see Guib., *op. cit.*, iii. 548, 550.

[4] Some, especially *Z. nitidum*, *piperitum*, flower in our greenhouses.

GENERA.

I. RUTEÆ.

1. **Ruta** T.—Flowers hermaphrodite regular; receptacle convex. Sepals 4, 5, free or connate at base, imbricated. Petals same in number, alternate, often fornicate, dentate or ciliate, imbricated or contorted. Stamens 8–10, inserted below urceolate thick glandular or foveolate disk; filaments free, dilated at base (the oppositipetalous rather shorter); anthers introrse, 2-rimose. Carpels 4, 5, oppositipetalous; germens free or adnate at base between themselves and with the summit of receptacle, 1-locular; styles same in number, free at base, shortly coalescing in column capitellate stigmatiferous at apex; ovules in each germen 2–∞, 2-seriate descending or subtransverse anatropous. Fruit carpels 4, 5, nearly free or more or less connate at base, dry capsular, or inwardly dehiscing at apex, more rarely higher connate, subfleshy, with difficulty or not at all dehiscing at apex (*Ruteria*). Seeds angular; testa dusky largely punctuate; albumen fleshy; embryo rather thick more or less curved; cotyledons sometimes 2-partite; radicle conical.—Herbs perennial at base, or undershrubs glandular-punctuate graveolens; leaves alternate simple or 3-sect (*Haplophyllum*), usually 3-foliolate, pinnatisect or decompound; flowers in terminal or axillary cymiferous racemes foliaceous-bracteate; terminal ones usually 5-merous, lateral usually 4-merous (*Med. regions, Western and Central Asia*). See p. 380.

2. **Bœnninghausenia** REICHB.[1]—Flowers nearly of *Ruta*, 4-merous; sepals connate at base. Stamens 8 or more rarely 6, 7, of which 4 are alternipetalous longer. Disk within stamens cupuliform, crenate at margin. Gynæceum long stipitate; carpels 4, oppositipetalous free; styles 4, coalescing in column stigmatiferous at apex; ovules in each germen 4–8, 2-seriate. Fruit 4-coccous stipitate, furnished with persistent base of calyx and disk; cocci free patent

[1] *Consp.*, 197 (nec SPRENG.).—ENDL., *Gen.*, n. 6026.—B. H., *Gen.*, 287, n. 11.— ? *Podostaurus* JUNGH., in *Nat. et Gen. Arch.*, ii. 45 (ex ENDL., *Gen.*, Suppl., iv. 101).

membranous, dehiscing by ventral sutures. Scanty seeds and other characters of *Ruta*.—Perennial glandular-punctuate fragrant herbs; stems and branches slender terete; leaves alternate, 2-pinnate; folioles entire; flowers[1] in terminal compound-cymiferous racemes; cymes more or less regular, sometimes 1-parous at apex; bracts small foliaceous entire[2] (*Northern India, Japan*[3]).

3. **Thamnosma** Torr. & Frem.[4]—Flowers 4-merous; sepals short. Petals sessile entire, in false campanulate or tubular corolla, connivent free, imbricated. Disk thin, annular or cupuliform, crenate or lobed. Stamens 8, 2-seriate, inserted at base of disk; filaments filiform; anthers short apiculate, introrsely 2-rimose. Germen long or shortly (*Rutosma*[5]) stipitate, 2-dymous, 2-locular (carpels ventrally long connate); style slender erect, stigmatiferous capitellate at apex; ovules in each cell 4–8, 2-seriate. Capsule coriaceous punctuate, 2-dymous; cells 2, inwardly dehiscing. Seeds few, subreniform, smooth or muricate (*Rutosma*); testa crustaceous; albumen fleshy; embryo curved.—Shrubs or herbs frutescent at base glandular-punctuate graveolens; leaves alternate entire simple, sometimes very scanty or almost wanting; flowers[6] ramified racemose at apex of branchlets (*California, Texas*[7]).

4. **Tetradriclis** Stev.[8]—Flowers 4-merous; receptacle depressed convex. Sepals small and petals longer, very shortly unguiculate persistent. Stamens 4, inserted with perianth; filaments thin subulate; anthers subglobose, 2-rimose. Carpels 4; germen 1-locular; style central gynobasic erect inserted between germens; apex 4-agonal angular stigmatiferous; ovules in each germen 2–6, obliquely inserted at interval angle. Capsule depressed-4-gonal; cells 2-spermous, loculicidal at angles; exocarp membranous separating from crustaceous endocarp. Seeds oblong; testa thin smooth; embryo rather short curved.—Fleshy glabrous many-stemmed herbs; leaves

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[1] Small, white.

[2] A genus much better made a section of *Ruta*.

[3] Spec. 1. *B. albiflora* Reichb., *loc. cit.*—Walp., *Rep.*, i. 517.—*Ruta albiflora* Hook., *Exot. Fl.*, t. 89.

In *Frem. Sec. Rep.*, 313; in *Whippl. Rep.*, 17, t. 3.—B. H., *Gen.*, 288, n. 15.

[5] A. Gray, *Gen. Ill.*, 143, t. 155.

[6] Small or large, yellow, the same by some referred to *Haplophyllum*.

[7] Spec. 2. Walp., *Ann.*, vii. 510.

[8] In *Bieb. Fl. Taur.-Caucas.*, iii. 277, 648.—C. A. Mey., *Verz. Cauc.-Casp. Pfl.*, 226.—Endl., *Gen.*, n. 6029.—B. H., *Gen.*, 288, n. 14.—*Anatropa* Ehrenb., in *Linnæa*, iv. 402.

alternate,[1] all pinnatisect or the upper laciniate; flowers[2] in terminal spikes,[3] at first scorpioid, foliaceous-bracteate (*Central and Western Asia, North-eastern Africa*[4]).

5. **Dictamnus** L.—Flowers hermaphrodite irregular; sepals 5, subequal, subimbricate. Petals 5, alternate dissimilar, imbricated; the outermost anterior declinate; superior 4, 2-nate ascending. Stamens 10, 2-seriate, inserted below rather thick disk; filaments free glandular, finally declinate; anthers sublaterally 2-rimose. Gynæceum shortly stipitate subexcentric; germens 5, oppositipetalous free; styles same in number, afterwards coalescing in column with tapering stigmatiferous declinate apex; ovules in each germen 2–4, or oftener 3, of which 2 are usually ascending; raphe extrorse; the third descending; raphe dorsal. Fruit cocci usually 5, rostrate compressed, hispid-glandular, elastically 2-valved; endocarp solute. Seeds subglobose; testa black nitid; albumen fleshy; embryo rather thick; radicle short.—A graveolens herb, suffrutescent at base, sprinkled with slightly prominent glands; leaves alternate imparipinnate; leaves serrulate pellucid-punctuate; flowers in terminal simple or ramified cymiferous racemes; pedicels bracteolate (*Europe, Temp. Asia*). See p. 383.

II. CUSPARIEÆ.

6. **Erythrochiton** Nees & Mart.—Flowers hermaphrodite, regular or irregular, 5-merous; receptacle convex. Calyx widely tubular-campanulate (coloured), 5-agonal or costate, valvate, finally unequally-cut, sub-2-labiate or 3–5-fid. Petals connate or coalescing in long straight or curved tubular corolla; lobes 5, imbricated, equal or slightly unequal, imbricate or induplicate-valvate, finally equal or sub-2-labiate patent. Stamens 5–7; filaments all connate or coalescing, adherent to tube of corolla with apices nearly free at throat, of which 5 are alternipetalous, all antheriferous or 3 antherless; oppositipetalous 1, 2, smaller sterile; anthers erect elongated, naked

[1] At first opposite.
[2] Small, lutescent.
[3] False (?).
[4] Spec. 1. *T. salsa* Stev., *loc. cit.*—Ledeb., *Fl. Ross.*, i. 592.—Claus, in *Gæb. Reis.*, ii. 319.—Fenzl., in *Linnæa*, xiv. 289, t. 2.—Boiss., *Fl. Or.*, i. 918.—Walp., *Rep.*, i. 519; ii. 825. —*T. Eversmanni* Bge., in *Linnæa*, xiv. 177, t. 1.—*Anatropa tenella* Ehrenb., *loc. cit.*

or auriculate at base, introrsely 2-rimose. Disk elevated conical-tubular, longer than germens. Germens 5, oppositipetalous free, 1-locular; styles same in number inserted at summit of internal angle, sometimes cohering in column, widely capitate stigmatiferous at apex; ovules in each cell 2, descending; micropyle extrorse superior. Fruit (surrounded by calyx) of 5 cocci, 2-valved; endocarp solute elastically 2-lobed. Seeds in each 1, 2, subreniform; testa crustaceous, tuberculate or muricate, within wide hilum and near chalaza marked with orbicular opercule; embryo scantily albuminous; cotyledons much plicate-convolute; dorsal exterior involving ventral; radicle superior incurved. — Glabrous shrubs simple or slightly ramified; leaves against the apex of stems or branches crowded alternate elongate-lanceolate, 1-foliolate entire; flowers hypophyllus or on peduncles lateral to leaves drawn beyond axil and more or less long connate, with branches sometimes leaf-bearing, alternately cymose (*Brazil, Guiana, Columbia, Mexico*). See. p. 385.

7. **Almeidea** A. S. H.[1]—Flowers regular or subregular; calyx short, 5-dentate, slightly imbricate. Petals 5,[2] erect; attenuated at base, sometimes inwardly foveolate, erect, imbricate. Stamens 5, alternipetalous, free; filaments complanate, inwardly above middle canaliculate, above barbate, subulate at apex; anthers oblong, introrsely 2-rimose, finally versatile. Disk shortly tubular, and gynæceum of *Erythrochiton*. Fruit capsular; cocci free, 1–5, 2-valved, 1-spermous; endocarp solute; seed nearly of *Erythrochiton*.—Trees or shrubs; leaves alternate or at summit of branches opposite petiolate, 1-foliolate, entire, glandular-punctuate; flowers[3] in compound racemes, bracteate; pedicels 2-bracteolate (*Brazil*[4]).

8 ? **Spiranthera** A. S. H.[5]—Flowers subregular (nearly of *Almeidea*); petals 5, elongate-linear, pubescent, sometimes slightly curved,

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[1] In *Bull. Soc. Philom.* (1823), 129; *Pl. Rem. Brés.*, i. 142, t. 15; *Fl. Bras. Mer.*, i. 85, t. 18.—DC., *Prodr.*, i. 729.—A. Juss., in *Mém. Mus.*, xii. 492, t. 23, fig. 33.—Spach, *Suit. à Buffon*, ii. 348.—B. H., *Gen.*, 284, n. 2.—Ag., *Theor. Syst. Pl.*, t. 19, fig. 10.—*Aruba* Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 152, t. 19, 27, 29 (nec Aubl.).

[2] Sometimes slightly fleshy.

[3] Handsome, red, lilac, or sometimes bluish.

[4] Spec. ad 10. Walp., *Rep.*, i. 499; *Ann.*, i. 154; ii. 246; iv. 410; vii. 506.

[5] In *Bull. Soc. Phil.* (1823), 130; *Pl. Rem. Bras.*, 147, t. 17; *Fl. Bras. Mer.*, i. 43.—DC., *Prodr.*, i. 728.—A. Juss., in *Mém. Mus.*, xii. 892, t. 23, fig. 3.—Spach, *Suit. à Buffon*, ii. 347.—Endl., *Gen.*, n. 5988.—B. H., *Gen.*, 283, n. 1.—*Terpnanthus* Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 152, t. 19.

imbricated. Stamens 5, fertile, free, externally inserted below disk; filaments long subulate, glandular-verrucose; anthers introrse, 2-rimose, versatile. Gynæceum of *Erythrochiton;* germen stipitate; stipes included in vagina of disk. Capsule 2–5-coccous; cocci, seeds, and other characters of *Erythrochiton.*—A glabrous shrub; leaves alternate, petiolate, 3-foliolate; folioles entire, acuminate, glandular-punctuate; flowers[1] in slightly ramified terminal cymiferous racemes[2] (*Brazil*[3]).

9. **Leptothyrsa** Hook. f.[4] — Flowers regular; calyx obconical cupuliform, subentire. Petals 4, long exserted, linear, erect, acute, free at apex, connivent in tube, imbricated,[5] finally patent. Flowers 4, alternipetalous; filaments free, glabrous; anthers linear, longer than filaments, introrsely 2-rimose. Urceolate disk and gynæceum (4-merous) of *Erythrochiton.* Capsule 1–4-coccous; endocarp solute; seeds ovoid, albumen thin; embryo thick; cotyledons plano-convex, including radicle.—A glabrous shrub;[6] stem simple; leaves alternate, collected at apex of stems, obovate-lanceolate, acuminate, very narrow at base, articulate; flowers[7] in cymiferous racemes (*North Brazil*[8]).

10. **Toxosiphon** H. Bn.[9]—Flowers 5-merous; calyx 5-phyllous, sepals long 3 angular (coloured), free, valvate, persistent round fruit.[10] Petals 5, alternate, in tubular arched corolla, cohering at middle by means of staminal filaments, base and apex free; limb not dilated, imbricated, exterior densely villous. Stamens 5, alternipetalous filaments free complanate, externally more or less adherent to corolla; antherless 5; fertile 2, anthers large, oblong, erect, introrse, 2-rimose. Disk cupuliform, shorter than germen, 5-crenate. Carpels 5, ovules, 5-cocci, and seeds of *Erythrochiton;* embryo (exalbuminous?); cotyledons much plicate-convolute.—A glabrous shrub (?); leaves alternate, collected at summit of branches, long petiolate; foliole 1, articulate, oblong-lanceolate, long narrow at base, acuminate at apex, entire, membranous, penninerved; flowers[11] in false scanty racemes (growing from the wood) (*Mexico*[12]).

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[1] Handsome, fragrant, white.

[2] A genus nearly allied to *Almeidea,* differing in its filaments not inwardly foveolate, or barbate, gynæceum stipitate and leaves 3-foliolate.

[3] Spec. 1. *S. odoratissima* A. S. H., *loc. cit.* —Walp., *Rep.,* i. 499.

[4] *Gen.,* 284, n. 3.—H. Bn., in *Adansonia,* x. 310.

[5] Not valvate at apex, as said.

[6] "Socialis."

[7] "Cum pedunculis albis."

[8] Spec. 1. *L. Sprucei* Hook. f., *loc. cit.*

[9] In *Adansonia,* x. 311.

[10] And there not accrescent, greenish veined.

[11] White; calyx in flower reddish.

[12] Spec. 1. *T. Lindeni* H. Bn., *loc. cit.*

11. **Galipea** Aubl.[1]—Flowers 4- or oftener 5-merous; calyx short, equally or unequally 5-fid or 5-dentate, imbricate. Corolla irregular or more rarely subregular; leaves below connivent in tube or more rarely connate, valvate or imbricate. Stamens 5–8; filaments usually adhering to tube of corolla, free at apex; alternipetalous, antheriferous 5 or much oftener 2; others antherless, glandular at apex; oppositipetalous 2, 3, sterile, minute; fertile anthers oblong, inappendiculate at base, introrsely 2-rimose. Disk round gynæceum varied. Carpels 4, 5, oppositipetalous; germens free, style, ovules, fruit, and seeds of *Erythrochiton*.—Trees or shrubs; leaves alternate, petiolate, 1–7-foliolate; folioles entire, rarely serrate, pellucid-punctuate, glandular or rarely epunctuate; inflorescence[2] (of *Erythrochiton*) axillary or extra-axillary, simple or ramified, cymiferous (*Trop. South-eastern America*[3]).

12? **Ticorea** Aubl.[4]—Flowers nearly of *Galipea;* tube of corolla usually elongated; limb subregular. Stamens usually 7; filaments free or connate, and adnate or cohering to tube of corolla; fertile usually 2, alternipetalous; anther cells appendiculate. Other characters of *Erythrochiton* (or *Galipea*).—Trees or shrubs; leaves opposite or alternate, simple or 1–3-foliolate; folioles entire, pellucid-punctuate; flowers[5] in simple or more usually ramified cymiferous pedunculate aphyllous racemes; inflorescence terminal, lateral or falsely axillary; pedicels bracteate[6] (*Brazil, Guiana*[7]).

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[1] *Guian.*, ii. 662, t. 269.—A. S. H., in *Bull. Soc. Philom.* (1823), 131; *Pl. Rem. Brés.*, 129, t. 12–14; *Fl. Bras. Mer.*, i. 87.—A. Juss., in *Mém. Mus.*, xii. 493, t. 23, fig. 34.—Spach, *Suit. à Buffon*, ii. 351.—Endl., *Gen.*, n. 5990.—B. H., *Gen.*, 285, n. 6.—H. Bn., in *Adansonia*, x. 306.—*Raputia* Aubl., *op. cit.*, ii. 670, t. 272.—*Sciuris* Schreb., *Gen.*, i. 54.—*Pholidandra* Neck., *Elem.*, 542.—*Conchocarpus* Mikan, *Delect.*, i. t. 2.—*Bonplandia* W., in *Act. Soc. Nat. Cur. Berol.* (1802), 24.—*Cusparia* H., *Tabl. Géogr.* (ex DC., in *Mém. Mus.*, ix. 143).—*Angostura* Rœm. & Sch., *Syst.*, iv. 188.—*Lasiostemon* Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 152, 171, t. 12, 26.—*Ravia* Nees & Mart., *loc. cit.*, 169, t. 19, E, 23, 24.—*Aruba* Nees & Mart., *loc. cit.*, t. 28 (nec Aubl.)—*Obentonia* Velloz., *Fl. Flum.*, i. t. 46.—*Dangervilla* Velloz., *loc. cit.*, t. 66.—*Rossenia* Velloz., *loc. cit.*, t. 77.—? *Naudinia* Pl. & Lind., in *Ann. Sc. Nat.*, sér. 3, xix. 79.—B. H., *Gen.*, 285, n. 5.

[2] Flowers large, white, lilac, or pink, sometimes fragrant.

[3] Spec. ad 20. H. B. K., *Pl. Æquin.*, ii. 59, t. 97 (*Bonplandia*).—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 5, xiv. 305.—*Bot. Mag.*, t. 4948.—Walp., *Rep.*, i. 499; *Ann.*, ii. 246; vii. 507.

[4] *Guian.*, ii. 689, t. 277.—DC., in *Mém. Mus.*, ix. 144, t. 8, 9; *Prodr.*, i. 730.—A. S. H., *Pl. Rem. Brés.*, i. 139, t. 14, fig. D; *Fl. Bras. Mer.*, i. 91.—A. Juss., in *Mém.*, xii. 495, t. 23, fig. 35.—Endl., *Gen.*, n. 5993.—B. H., *Gen.*, 285, n. 6.—H. Bn., in *Adansonia*, x. 308.—*Ozophyllum* Schreb., *Gen.*, n. 1105.—*Sciuris* Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 151, t. 18, 20 (part.).—*Costa* Velloz., *Fl. Flum.*, i. t. 48.

[5] White, sometimes yellow-spotted, greenish or reddish.

[6] A genus much better made a section of *Galipea*.

[7] Spec. ad 10. Walp., *Rep.*, i. 500.

13. **Ravenia** Velloz.[1]—Flowers nearly of *Galipea;* sepals 5, very unequal; exterior 2 much larger, foliaceous; præfloration imbricated.[2] Corolla gamopetalous, very irregular; tube rather wide and straight; limb oblique 5-lobed, unequally oblique, imbricated. Stamens 7, of which 2 fertile, alternating with petals, bearing introrse 2-rimose anthers; sterile 5, subulate-glandular, antherless, of which 3 larger are alternipetalous, 2 smaller thinner, alternipetalous, alternating with alternipetalous staminodes; filaments all connate coalescing with tube of corolla. Disk shortly tubular, and gynæceum of *Galipea* (or *Erythrochiton*); styles 5, coalescing in tube, at apex free, stigmatiferous. Fruit and other characters of *Erythrochiton;* calyx persistent round capsule.—Glabrous pellucid-punctuate (fragrant) shrubs: leaves opposite, 1–3-foliolate; flowers[3] axillary, solitary or scantily cymose, bracteate (*Cuba, Brazil*[4]).

14. **Monniera** L.[5]—Flowers nearly of *Ravenia;* sepals herbaceous, very unequal, imbricated; exterior 2, 3, larger foliaceous.[6] Corolla nearly of *Ravenia,* sub-2-labiate. Stamens 5, alternipetalous; filaments connate with tube of corolla; fertile 2, with introrse 2-rimose anthers; sterile 3, subulate barbate glandular at apex. Disk oblique or 1-lateral,[7] squamiform. Gynæceum of *Erythrochiton* (or *Ravenia*); style capitate at apex. Fruit, seeds, and other characters of *Erythrochiton.*—Annual, glabrous or villous herbs; leaves alternate, 3-foliolate, thinly punctuate; folioles entire, membranous; flowers[8] in axillary, pedunculate, slightly ramified cymes, 1-parous, falsely racemose (*Guiana, Brazil*[9]).

III. DIOSMEÆ.

15. **Coleonema** Bartl. & Wendl.—Flowers hermaphrodite; receptacle subplane or rather concave, outwardly produced in cupuli-

[1] *Fl. Flum.*, i. 20, t. 49.—Pl., in *Ann. Sc. Nat.*, sér., 3, xix. 75.—B. H., *Gen.*, 286, n. 8.—*Lemonia* Lindl., in *Bot. Reg.* (1840), t. 59.

[2] For præfloration and form see H. Bn., in *Adansonia*, x. 308.

[3] Handsome, white, pink, or reddish; perianth and androceum pellucid-punctuate.

[4] Spec. 2. Walp., *Rep.*, v. 387 (*Lemonia*).

[5] L., *Gen.*, n. 850.—A. Juss., in *Mem. Mus.*, xii. t. 52, fig. 31.—DC., *Prodr.*, i. 729.—Endl., *Gen.*, n. 5994.—B. H., *Gen.*, 286, n. 9.—H. Bn., in *Adansonia*, x. 309.—*Aubletia*, Rich., in *Pers. Syn.*, ii. 638 (nec Lour., nec Gærtn., nec Schreb., nec Jacq.).

[6] Simulating floral bracts.

[7] Opposite, intermediate.

[8] Small, not handsome, sessile.

[9] Spec. 2. Aubl., *Guian.*, ii. 730, t. 293.—H. B. K., *Nov. Gen. et Spec.*, vi. 9.—Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 162, t. 18.—Tr. in *Ann. Sc. Nat.*, sér. 5, xiv. 305.

form entire, sinuate or 5-lobed glandular disk. Calyx 5-partite; lobes ovate-acute, or aristate, imbricated. Petals obovate unguiculate glabrous, inwardly from base to middle thickened-canaliculate, imbricated or more rarely contorted. Stamens 10, of which 5 are alternipetalous, fertile glabrous; filament inserted without disk, usually subperigynous, free; anthers 2-locular, introrsely rimose, glandular terminate; oppositipetalous 5, reduced to staminodes, included in canaliculate petals or recondite adnate. Carpels 5, oppositipetalous, or more rarely 2–4; ovary free, naked at apex or terminating dorsally in glandular thickening; styles 5, free at base, afterwards coalescing in erect column, capitellate-stigmatiferous 5-lobed at apex; ovules 2, subcollateral or subsuperposed descending; micropyle extrorse superior. Fruit cocci 5, compressed rugose, corniculate at apex; endocarp solute, finally 2-valved. Seeds in each coccus 1, 2; embryo exalbuminous fleshy. — Ericoid glandular-punctuate shrubs; branches slender; leaves alternate linear, very acute, ciliate at margin, serrulate or smooth; flowers solitary at apex of twigs or scantily cymose, bracteolate; bractlets adpressed (*South-Western Africa*). See p. 390.

16. **Adenandra** W.[1]—Flowers nearly of *Coleonema;* receptacle more or less cupuliform. Petals subsessile naked. Stamens 10, of which 5 are sterile, opposite petals, not recondite; the fertile terminating in glandular stipitate anthers. Germens 2–5, bearing stipitate glandules; styles coalescing in short sulcate curved column, discoid-stigmatiferous 5-lobed at apex. Cocci glandular-muricate, obtuse or corniculate.—Erect ramified glandular-punctuate shrubs; leaves alternate, sometimes imbricated, or more rarely opposite subsessile small coriaceous, entire or callose at margin and apex; petioles sometimes 2-glandular; flowers (rather large)[2] sessile at apex of twigs or subumbellate or racemose; pedicels 2-bracteolate (*South Africa*[3]).

17. **Acmadenia** Bartl. & Wendl.[4]—Flowers of *Adenandra;* pe-

[1] *Enum. Pl. Berol.*, 256.—Bartl. & Wendl., *Diosm.*, 59, t. A.—A. Juss., in *Mém. Mus.*, 470, t. 19, fig. 6.—Spach, *Suit. à Buffon*, ii. 327.—Endl., *Gen.*, n. 6015.—B. H., *Gen.*, 290, n. 22.—*Glandulifolia* Wendl., *Collect.*, i. 33–37.

[2] White, or rarely pink.

[3] Spec. 21. Berg., *Fl. Cap.*, 70 (*Hartogia*). —Thunb., *Fl. Cap.*, 226, 228 (*Diosma*).—L., *Spec.*, 227 (*Diosma*). — Bartl., in *Linnæa*, xvii. 358. — Link., *Enum.*, 239. — Eckl. & Zeyh., *Enum.*, 779.—Harv. & Sond., *Fl. Cap.*, i. 384.—*Bot. Mag.*, t. 273, 1271, 1519 (*Diosma*). —Walp., *Ann.*, vii. 512.

[4] *Diosm.*, 59, t. A, fig. 4.—A. Juss., in *Mém. Mus.*, xii. 473, t. 18, fig. 11.—Endl., *Gen.*, n. 6019.—B. H., *Gen.*, 289, n. 21.

tals unguiculate; claws barbate. Stamens usually 10, of which 5 are fertile; anthers muticous or terminated by sessile glands. Cocci 2–5, compressed transversely rugose, corniculate at apex. Seeds and other characters of *Adenandra*.—Ericoid, glandular-punctuate shrubs; leaves alternate or opposite, often imbricated, 3-quetrous conduplicate, entire at margin, serrulate or ciliate; flowers solitary at apices of twigs or 2, 3 or more rarely collected, and protected by summit of imbricated leaves or bracts (*South Western Africa*[1]).

18. **Agathosma** W.[2]—Flowers of *Adenandra*; petals unguiculate; claws often pilose or slightly hispid. Stamens 10, 5 sterile oppositipetalous, narrow, petaloid, and 5 fertile; filaments usually longer than perianth; anthers minutely glandular at apex. Carpels 2–5; styles coalescing in elongate-filiform glabrous column, simple, stigmatiferous at apex. Cocci 2–5, compressed, cornutus; seeds and other characters of *Adenandra*.—Erect ramified glandular-punctuate shrubs or undershrubs; leaves alternate, sometimes imbricated; more rarely opposite, usually flat or sub-3-agonal, entire or glandular-denticulate; flowers at apex of twigs subumbellate or capitate, very rarely axillary; peduncles (sometimes very short), 2-bracteolate at middle (*South Africa*[3]).

19. **Barosma** W.[4]—Flowers of *Adenandra*, sometimes polygamous;[5] petals subsessile, naked. Germens 3–5, often glandular-tuberculate, rostrate auriculate at apex; styles of *Agathosma* (in male flower minute or 0). Cocci 3–5, rostrate, compressed, glandular; seeds and other characters of *Adenandra*.—Erect ramified glandular-punctuate small shrubs; leaves alternate or oftener opposite, coriaceous, flat or revolute at margin, entire or glandular-crenate; flowers axillary, solitary or 2, 3-nate; pedicels bracteate and bracteolate (*South Africa*[6]).

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[1] Spec. ad 13. Harv. & Sond., *Fl. Cap.*, i. 379.—Walp., *Ann.*, vii. 512.

[2] *Enum. Pl. Berol.*, 259.—Bartl. & Wendl., *Diosm.*, 121, t. B.—A. Juss., in *Mém. Mus.*, xii. 475, t. 20, fig. 19.—Spach, *Suit. à Buffon*, ii. 332.—Endl., *Gen.*, n. 6021.—B. H., *Gen.*, 290, n. 24.—*Bucco* Wendl., *Collect.*, t. 2, 3, 13, 28, 77. — *Gymnonychium* Bartl., in *Linnæa*, xvii. 354, t. 11. — *Dichosma* DC., *Prodr.*, i. 714.

[3] Spec. ad 100. Harv. & Sond., *Fl. Cap.*, ii. 399. —*Bot. Reg.*, t. 336, 339.—Walp., *Ann.*, vii. 513.

[4] *Enum. Pl. Berol.*, 257.—Bartl. & Wendl., *Diosm.*, 94, t. B.—A. Juss., in *Mém. Mus.*, xii. 474, t. 29, fig. 18.—Spach, *Suit. à Buffon*, ii. 330. —Endl., *Gen.*, n. 6020.—B. H., *Gen.*, 290, n. 23.—*Parapetalifera* Wendl., *Collect.*, 92, t. 15, 34.—*Baryosma* Rœm. & Sch., *Syst.*, v. 25.

[5] Receptacle usually cupuliform.

[6] Spec. ad 15. Thunb., *Fl. Cap.*, 227, 229 (*Diosma*).—Harv. & Sond., *Fl. Cap.*, i. 392.—*Bot. Mag.*, t. 582, 1616 (*Diosma*), 3413.—Walp., *Ann.*, iv. 412; vii. 512.

20. **Diosma** Berg.[1]—Flowers of *Adenandra;* stamens 5, alternipetalous, fertile; filaments subulate; anthers oblong, glandular terminate. Germens 5, free; styles soon coalescing in glabrous curved column, capitate stigmatiferous at apex. Cocci transversely rugose, corniculate at back; endocarp solute; seeds and other characters of *Adenandra.*—Small ericoid shrubs, glabrous or pilose pellucid-punctuate; branches virgate; leaves alternate or opposite, linear, dorsally carinate or rotund, sometimes 3-quetrous, ciliate or scabriusculous at margin, sometimes serrulate; flowers solitary or subumbellate at apex of branches; pedicels short, 2-bracteolate (*South-western Africa*[2]).

21. **Euchætis** Bartl. & Wendl.[3]—Flowers of *Diosma;* petals oblong-lanceolate, unguiculate, inwardly transversely barbate.[4] Germen 5; styles coalescing in short thick column, capitate stigmatiferous at apex. Cocci 5; other characters of *Diosma.*—Ericoid shrubs or small shrubs; branches virgate; leaves alternate or very often opposite, 3-quetrous or carinate, more rarely dorsally convex, glabrous or ciliate, at margin epunctuate, pellucid, entire, serrulate or ciliate; flowers solitary or subcapitate at apex of branches; pedicels very short, 2-bracteolate (*South-western Africa*[5]).

22. **Macrostylis** Bartl. & Wendl.[6]—Flowers of *Diosma;* petals subspathulate, unguiculate, barbate at middle.[7] Germens usually 2, 3; styles subbasilar, coalescing in erect thick elongated column, tapering at base, simple or capitellate stigmatiferous at apex. Cocci 2, 3, cornutus; seeds and other characters of *Diosma.*—Suberect or depressed pellucid-punctuate small shrubs; leaves alternate and opposite, sometimes subimbricate, small, rather flat or 3-quetrous, glabrous or slightly pilose, sometimes carinate; flowers subumbellate or subcapitate at apex of branches; pedicels short, bracteolate at base (*South Africa*[8]).

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[1] *Fl. Cap.*, 62.—L., *Gen.*, n. 272.—Bartl. & Wendl., *Diosm.*, 55, t. A.—A. Juss., in *Mém. Mus.*, xii. 472, t. 18, fig. 13.—DC., *Prodr.*, i. 716 (part.).—Spach, *Suit. à Buffon*, ii. 329.—Endl., *Gen.*, n. 6017.—B. H., *Gen.*, 289, n. 19.

[2] Spec. ad 10. Harv. & Sond., *Fl. Cap.*, i. 373.—*Bot. Mag.*, t. 2332.—Walp., *Ann.*, vii. 511.

[3] *Diosm.*, 15, t. A.—A. Juss., in *Mém. Mus.*, xii. 472.—Endl., *Gen.*, n. 6018.—B. H., *Gen.*, 289, n. 17.

[4] Stamens inserted outside annular disk.

[5] Spec. 4. Harv. & Sond., *Fl. Cap.*, i. 371 (part.).—Walp., *Ann.*, vii. 510.

[6] *Diosm.*, 191, t. B, fig. 8.—A. Juss., in *Mém. Mus.*, xii. 476, t. 19, fig. 20.—Endl., *Gen.*, n. 6022.—B. H., *Gen.*, 289, n. 18.

[7] Stamens high perigynous, inserted with perianth on margin of cupuliform receptacle.

[8] Harv. & Sond., *Fl. Cap.*, i. 373 (*Euchætis*), 439.—Walp., *Ann.*, vii. 511.

23. **Empleurum** Soland.[1] — Flowers monœcious, apetalous, 4-merous. Calyx gamophyllous cupuliform-subcampanulate, 4-fid. Stamens 4, opposite calyx-lobes; filaments free, subulate, in male flower inserted below minute rudimentary gynæceum; anthers large, exserted, introrse; cells divergent on both sides, crowned with sessile gland at apex; clefts longitudinal, submarginal. Carpels in female flower 1 (or very rarely 2), excentric, sessile. Style of germen rather short, terete, curved, glabrous, stigmatiferous at apex, simple above, dorsally produced at apex in long rostrum; ovules 2, inserted in internal angle, collaterally descending; micropyle extrorse, superior. Fruit long lanceolate, produced above in elongated rostrum; endocarp finally separating; seeds 1, 2, of *Diosma*, nigricans glabrous.—An erect glabrous pellucid-punctuate shrub; branches virgate; leaves alternate, linear-lanceolate, crenulate glandular; flowers small, in few-flowered axillary cymes; peduncle bracteolate at base (*South Africa*[2]).

24? **Empleuridium** Sond.[3]—"Flowers diœcious, 4-merous; calyx lobes patent, imbricated. Petals 4, deciduous. Stamens 4, inserted below marginal angles of explanate subquadrate disk; filaments subulate; anthers 2-dymous. Female flower . . . ? Fruit carpel 1, linear-oblong, apiculate with persistent terminal style (in male flower short, inserted at middle of disk); seed 1.—An undershrub, ramified from base; branches slender; leaves alternate, acicular, 3-quetrous, epunctuate; flowers axillary, solitary, minute, pedunculate; peduncles 2-bracteate[4] at base (*South-western Africa*[5]).

25. **Calodendron** Thunb.[6]—Flowers subregular; sepals usually 5, valvate. Petals 5, alternate, elongate, unequally-patent or reflexed, imbricated. Stamens 10, 5 fertile, alternipetalous; filaments free, glandular, inserted below shortly cupuliform disk; anthers exserted,

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[1] Ex Lamk., *Ill.*, t. 86.—Ait., *Hort. Kew.*, ed. 1, iii. 340.—Gærtn. f., *Fruct.*, iii. 340.—Bartl. & Wendl., *Diosm.*, t. B.—A. Juss., in *Mém. Mus.*, xii. 476, t. 19, fig. 21.—DC., *Prodr.*, i. 718.—Spach, *Suit. à Buffon*, ii. 334.—Endl., *Gen.*, n. 6023.—B. H., *Gen.*, 291, n. 25.—Berg. & Schm., *Off. Gew.*, i. t. 2 *b*.

[2] Spec. 1. *E. serrulatum* Ait., *loc. cit.*—Harv. & Sond., *Fl. Cap.*, i. 442.—Walp., *Ann.*, vii. 515.—*Diosma ensata* Thunb., *Fl. Cap.*, 226.

[3] *Fl. Cap.*, i. 442.—Harv., *Thes. Cap.*, t. 77.—B. H., *Gen.*, 291, n. 26.

[4] "Gen. multis notis *Celastrineis* accedens." (B. H.).

[5] Spec. 1. *E. juniperina* Sond., *loc. cit.*

[6] *Nov. Gen.*, ii. 41; *Fl. Cap.*, 197.—Lamk., in *Journ. Hist. Nat.*, i. 56, t. 3.—DC., *Prodr.*, i. 712.—A. Juss., in *Mém. Mus.*, xii. 469, t. 19, fig. 15.—Spach, *Suit. à Buffon*, ii. 326.—Endl., *Gen.*, n. 6014.—B. H., *Gen.*, 288, n. 16.—*Pallasia* Houtt., *Pl. Syst.*, iii. 319, t. 22.

glandular at apex, introrsely rimose; 5 sterile oppositipetalous, inserted slightly above disk, long petaloid, sparsely glandular, glandular at apex. Germen central, long stipitate; cells 5, oppositipetalous, tuberculate, each crowned with conoid gland at apex; ovules 2, descending; micropyle extrorse, superior; style slender, inserted at summit of germen, stigmatiferous, entire, not dilated at apex. Capsule stipitate, thick, ligneous, subglobose-5-agonal, echinate, septicidally 5-valved; endocarp cartilaginous, free, circumcissile at margin; seeds subhorizontal; testa crustaceous; embryo exalbuminous; cotyledons conferruminate, thick, fleshy, oily; radicle minute.—A lofty pellucid-punctuate tree; branches decussate, opposite or 3-nate; leaves decussate, petiolate, acutely crenulate, parallel nerved; flowers in terminal compound cymiferous racemes[1] (*South Africa*).

IV. BORONIEÆ.

26. **Boronia** Sm.—Flowers 4-merous; receptacle rather convex or concave. Sepals free or connate at base, decussate-imbricate. Petals 4, alternate, scarcely unguiculate, imbricated. Stamens 8, 2-seriate, hypogynous or perigynous, inserted without glandular disk; filaments free, glabrous, ciliate, tuberculate or glandular below apex, more rarely pilose; the oppositipetalous sometimes antherless; anthers ovate or cordate, muticous at apex or sometimes produced in various appendices, introrsely 2-rimose. Carpels 4, oppositipetalous, surrounded at base by disk; germens free, 2-ovulate; ovules descending, collateral or superposed; micropyle extrorse, superior; others sometimes ascending; styles 4, soon coalescing in one, stigmatiferous capitate 4-lobed apex. Cocci 2–4, free, 1, 2-spermous, usually solute from endocarp, dehiscing. Seeds albuminous; embryo often terete.—Glabrous, pilose or tomentose shrubs, glandular-punctuate or tuberculate; odour rutaceous; leaves opposite, simple or 3-foliolate, often pinnate; folioles entire or serrulate, articulate; rachis sometimes winged; flowers axillary and terminal, solitary or cymose; cymes simple or ramified; pedicels bracteolate, articulate (*Australia*). See p. 393.

[1] Spec. 1. *C. capense* Thunb., *loc. cit.*, 41, 42, 43; *Prodr. Fl. Cap.*, 44.—Harv. & Sond., *Fl. Cap.*, i. 371.—*Pallasia capensis* Houtt., *loc. cit.* — *Dictamnus capensis* L. f., *Suppl.*, 232. — *D. Calodendron* Lamk., *Ill.*, t. 344, fig. 2.

27. **Boronella** H. Bn.[1]—Flowers of *Boronia;* receptacle rather convex. Sepals 4, decussate, imbricate; interior smaller. Petals 4, imbricate or contorted; stamens 8, 2-seriate; filaments pilose at base, afterwards glandular-verrucose; anthers ovate-acute, introrsely rimose, connective apiculate beyond cells. Disk suborbicular interior to stamens and 8-lobed between them. Carpels and styles 4, coherent among themselves, and capitellate-stigmatiferous at apex (of *Boronia*); germens 1-ovulate; ovule inserted slightly above the base, suborthotropous, ascending; micropyle superior.—A glabrous shrub; branches sub-2-chotomous; leaves opposite, collected at summit of branches, simple, subsessile, articulate, entire, glandular-punctuate; flowers[2] scantily cymose, rather long pedicellate, at summit of branches or in axils of upper leaves subumbellate (*N. Caledonia*[3]).

28. **Zieria** Sm.[4]—Flowers nearly of *Boronia*, 4- or more rarely 5-merous; receptacle rather convex, sometimes slightly concave. Sepals and petals valvate, or sometimes subimbricate or imbricate. Stamens 4, alternipetalous, inserted below, outside disk; filaments short, glabrous or pilose, inwardly glandular at base, usually thick, obtuse crowded; anthers introrse, apiculate.[5] Germen, fruit, seeds, and other characters of *Boronia*.—Trees or shrubs, glabrous or pilose, smooth or verrucose-glandular; leaves opposite, petiolate,[6] 3-foliolate or sometimes 1-foliolate, glandular-punctuate; flowers[7] axillary and terminal, rarely solitary, usually cymose or racemose-cymose; branches and branchlets of inflorescence articulate, 2-bracteolate (*Eastern Australia*[8]).

29. **Zieridium** H. Bn.[9]—Flowers of *Zieria;* receptacle shortly conical. Sepals 4, and petals same in number, valvate. Stamens 4, inserted below exterior of disk; filaments free; anthers short, introrse. Carpels 4, oppositipetalous, free; styles free, inserted at interior angle of germen slightly above the base, afterwards coalescing

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[1] In *Adansonia*, x. 302.

[2] When dry rather purple.

[3] Spec. 1. *B. Pancheri* H. Bn., *loc. cit.*, 304.

[4] In *Trans. Linn. Soc.*, iv. 216.—DC., *Prodr.*, i. 722.—A. Juss., in *Mém. Mus.*, xii. 443, t. 22, fig. 27.—Spach, *Suit. à Buffon*, ii. 341.—Endl., *Gen.*, n. 6003.—B. H., *Gen.*, 291, 989, n. 27.—*Boronia* (part.) F. Muell., *Fragm. Phyt. Austral.*, i. 101.

[5] Or more rarely muticous.

[6] Rarely sessile.

[7] White, usually very small.

[8] Spec. ad 10. Rudge, in *Trans. Linn. Soc.*, x. t. 17, fig. 2.—Deless., *Ic. Sel.*, iii. t. 48-50.—Benth., *Fl. Austral.*, i. 307.—*Bot. Mag.*, t. 1395.—Walp., *Rep.*, iii. 502; *Ann.*, ii. 247; vii. 515.

[9] In *Adansonia*, x. 303.

in gynobasic column, at apex all dilated, recurved, stigmatiferous, free. Ovule solitary in germens, inserted at internal angle near base, suborthotropous, ascending; micropyle superior.—A very slender, glabrous shrub; branches and twigs opposite; leaves opposite, pellucid-punctulate, digitate-3-foliolate; folioles membranous, unequally-crenate or dentate; flowers[1] in axillary cymes, generally 3-flowered, with very slender peduncules, shorter than the petiole (*N. Caledonia*[2]).

30. **Acradenia** KIPP.[3]—Flowers nearly of *Boronia*, hermaphrodite, 4–8-merous; receptacle convex. Sepals small, subvalvate or imbricated. Petals same in number, alternate, much longer, subunguiculate, velvety, imbricate. Stamens inserted with petals double in number; alternipetalous longer; filaments subulate glabrous; anthers introrsely 2-rimose. Disk glandular within and above stamens; lobes rather prominent between base of filaments. Gynæceum inserted at summit of receptacle; carpels 4, 5; germens free, dorsally produced in ovoid glands; style inserted below apex of internal angle, afterwards coherent and contorted among themselves, not dilated stigmatiferous at apex; ovules in each germen 2, collaterally descending; micropyle extorse superior, blocked by thick obturator. Fruit, cocci separating, subquadrate compressed truncate; endocarp solute dehiscent; seeds . . .?—A much ramified very glabrous shrub largely glandular-punctuate; leaves opposite petiolate, 3-foliolate; folioles obtuse coriaceous crenate-serrate; flowers[4] in axillary cymes 3-chotomous pedunculate and bracteolate (*Western Tasmania*[5]).

31. **Crowea** SM.[6]—Flowers (nearly of *Boronia*) 5-merous or more rarely 4-merous;[7] receptacle convex. Sepals free or connate at the base, imbricated, valvate or subvalvate, often incurved at apex

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[1] Very small, "virescentibus."

[2] Spec. 1. *Z. gracile* H. BN., *loc. cit.*, 304.

[3] In *Trans. Linn. Soc.*, xxi. 207, t. 22 (nec F. MUELL.).—B. H., *Gen.*, 292, 990, n. 30.

[4] White, not fragrant, ordinary.

[5] Spec. 1. *A. Franklinicæ* KIPP., *loc. cit.*—BENTH., *Fl. Austral.*, i. 328.

[6] In *Trans. Linn. Soc.*, iv. 220 (1798).—DC., *Prodr.*, i. 720.—A. JUSS., in *Mém. Mus.*, xii. 481, t. 21, fig. 24.—SPACH, *Suit. à Buffon*, ii. 337.—ENDL., *Gen.*, n. 6007.—B. H., *Gen.*, 293, 990, n. 35 (incl.: *Eriostemon* SM., *Phebalium* VENT.).

[7] Sometimes 6–8-merous in 1 species, viz., *C. Nottii* (*Eriostemon Nottii* F. MUELL., *Fragm.*, vi. 22), with calyx dentate, petals long narrowed at base, disk very small and germens all free 5–7; styles inserted at middle of internal angle of germen, afterwards coalescing, at apex shortly infundibuliform capitate. Petals outwardly lepidote, as are also leaves, germens, styles, &c. Stirps of *Crowea*, connected somewhat with *Acradenia*.

(*Phebalium*[1]). Petals same in number, alternate, imbricated or more rarely subvalvate. Stamens double in number to petals, 2-seriate; filaments inserted below disk more or less thick and varied in form, glabrous, hispid or villous; alternipetalous longer; anthers oval or oblong, shortly apiculate (*Eriostemon*[2]), or very rarely terminating in elongated barbate appendages (*Eucrowea*). Gynæceum superior; germens equal in number to petals and opposite, or more rarely 2, 3, free,[3] outwardly at back acute or rostrate, sometimes glandular; styles same in number inserted a greater or less height in the internal angle,[4] afterwards coalescing in erect column, stigmatiferous capitellate more or less lobed at apex; ovules in each germen 2, descending, collateral or superposed; micropyle extrorse superior. Fruit, cocci 2–5, sometimes rostrate; endocarp solute; seeds in each 1, 2, albuminous.—Glabrous, pilose or lepidote shrubs or small shrubs; leaves alternate simple, usually elongated glandular-punctuate; flowers[5] axillary or terminal, rarely solitary, usually cymose, racemose or umbellate (*Australia, particularly Extra-tropical, N. Zealand and N. Caledonia*[6]).

32. **Microcybe** Turcz.[7]—Flowers nearly of *Phebalium;* sepals[8] 1–5, free or variously connate among themselves. Petals 5, imbricated.[9] Stamens 10, 2-seriate; anthers minutely glandular at apex. Carpels 2; germens free obcuneate-orbicular stellate-tomentose, 2-ovulate; styles 2, ventral, afterwards coalescing in filiform columns simple stigmatiferous at apex. Fruit, cocci 2, cuneate-orbicular, 1-spermous.—Ericoid ramified small shrubs; branches glabrous or tomentose; leaves alternate sessile, patent or imbricated, linear or from margin revolute terete, coriaceous largely pellucid-punctuate;

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[1] Vent., *Malmais.*, 102 (1803). — DC., *Prodr.*, i. 719.—A. Juss., in *Mém. Soc. Hist. Nat. Par.*, ii. 130; in *Mém. Mus.*, xii. 479.—Endl., *Gen.*, n. 6009. — B. H., *Gen.*, 292, 990, n. 32.

[2] Sm., in *Trans. Linn. Soc.*, iv. 221.—DC., *Prodr.*, i. 720.—A. Juss., in *Mém. Mus.*, xii. 481, t. 21, fig. 25.—Endl., *Gen.*, n. 6006.—B. H., *Gen.*, 292, 900, n. 31.

[3] "In *Eriostemone trachyphyllo* F. Muell., ovar. (si fas sit fruct. judic.) integrum est et 4, 5-loculare." (B. H., *loc. cit.*).

[4] The place of insertion, which varies in divers species of *Eriostemon*, forms no good generic distinction from the legitimate *Croweas.*

[5] White or pink; more rarely red or yellow.

[6] Spec. ad 47. Deless., *Ic. Sel.*, iii. t. 45–47 (*Eriostemon*). — F. Muell., in *Hook. Kew Journ.*, viii. 36, 37; *Fl. Vict.*, i. 118, 129; *Fragm.*, iii. 102, 180 (*Eriostemon*).—Hook., *Icon.*, t. 57–59 (*Phebalium*). — Benth., *Fl. Austral.*, i. 328, 330 (*Eriostemon*), 336 (*Phebalium*). — *Bot. Mag.*, t. 2854, 3180 (*Eriostemon*).—Walp., *Rep.*, i. 503, 504, 505; ii. 248 (*Eriostemon*), 823 (*Phebalium*); v. 389; *Ann.*, i. 504; ii. 248, 249, 250 (*Phebalium*); vii. 519 (*Eriostemon*), 522 (*Phebalium*), 523.

[7] In *Bull. Mosc.* (1852), ii. 167.—B. H., *Gen.*, 293, 990, n. 33.

[8] Like bracts or leaves; calyx as in some species of *Urocarpus*, or obsolete *Diplolæna.*

[9] Persistent round fruit.

flowers[1] in dense terminal sessile heads involucrate with small leafy bracts at the base[2] (*Australia*[3]).

33. **Geleznovia** Turcz.[4]—Flowers nearly of *Boronia*, 4–5-merous; sepals petaloid much larger than corolla, persistent. Petals shorter more or less navicular, imbricated. Stamens 8–10, 2-seriate, shorter than petals; anthers oblong. Gynæceum nearly of *Boronia;* germens free, truncate at apex, 2-ovulate; styles terminal. Fruit cocci, 1–5.—Small shrubs largely glandular;[5] branches terete rigid; leaves alternate small sessile imbricated simple entire subovate veinless; flowers[6] at apex of branches solitary or scantily cymose, subsessile or shortly pedicellate; pedicels furnished with bracts more or less adpressed to coriaceous calyx (*South-western Australia*[7]).

34. **Philotheca** Rudge.[8]—Flowers nearly of *Boronia*, 5-merous; calyx and longer corolla imbricated. Stamens 10, either all fertile, anthers introrse; or sterile 5, antherless longer plumose-barbate (*Drummondita*[9]); filaments in conical tube, sometimes slightly incurved at apex 1-adelphous free only at apex, much villose-barbate. Gynæceum, fruit and other characters of *Boronia* (or *Geleznovia*).—Small ericoid glabrous shrubs, largely glandular-punctuate or tuberculate; leaves alternate imbricated slightly terete; flowers[10] terminal or axillary solitary shortly pedunculate (*Australia*[11]).

35. **Nematolepis** Turcz.[12]—Flowers nearly of *Boronia* (or *Philotheca*), 5-merous; calyx imbricated. Petals 5, valvate, coalescing in elongated tube, free at base and apex. Stamens 10, 2-seriate; filaments free inwardly at base enlarged into pilose squamules; anthers

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[1] White or yellowish, small.

[2] A genus allied to *Phebalium*, "differt ovarii forma, habitu, inflorescentia ovulisque collater." (B. H., *loc. cit.*).

[3] Spec. 3. F. Muell., in *Trans. Vict. Inst.*, i. 116 (*Asterolasia*); *Fragm.*, i. 106 (*Eriostemon*).—Benth., *Fl. Austral.*, i. 346.—Walp., *Ann.*, vii. 522.

[4] In *Bull. Mosc.* (1849), ii. 12.—B. H., *Gen.*, 293, 990, n. 34.—*Sandfordia*, J. Drumm., in *Hook. Kew Journ.*, vii. 53.

[5] When dry, rugose tuberculate from prominent glands.

[6] Rather large.

[7] Spec. 2. Benth., *Fl. Austral.*, i. 347.—F. Muell., *Fragm.*, i. 7 (*Eriostemon*).—Walp., *Ann.*, ii. 250; iv. 407 (*Sandfordia*); vii. 523.

[8] In *Trans. Linn. Soc.*, xi. 298, t. 21.—DC., *Prodr.*, i. 721.—A. Juss., in *Mém. Mus.*, xii. t. 21.—Endl., *Gen.*, n. 6008.—B. H., *Gen.*, 293, 990, n. 36.

[9] Harv., in *Hook. Kew Journ.*, vii. 53.—B. H., *Gen.*, 294, 990, n. 38.

[10] Rather large.

[11] Spec. 3. Sm., in *Rees Cyclop.*, xiii. (*Eriostemon*).—Turcz., in *Bull. Mosc.* (1849), ii. 16.—Benth., *Fl. Austral.*, i. 348, 349 (*Drummondita*).—Walp., *Rep.*, i. 505; *Ann.*, ii. 249; iv. 407 (*Drummondita*).

[12] In *Bull. Mosc.*, (1852), ii. 158.—B. H., *Gen.*, 295, n. 42.—*Symphyopetalum* J. Drumm., in *Hook. Kew Journ.*, vii. 54.

introrse. Gynæceum and other characters of *Boronia* (or *Philotheca*); cocci truncate.—Small ramified leafy shrubs; leaves alternate shortly petiolate oblong-obtuse entire coriaceous glandular-punctuate or lepidote; flowers[1] axillary solitary; peduncles 2-bracteolate above apex (*South-western Australia*[2]).

36. **Correa** Sm.[3]—Flowers (nearly of *Nematolepis*) 4-merous; calyx cupuliform truncate or obtusely 4-dentate, more rarely 4-lobed. Petals 4, elongated erect, connivent in cylindrical tube, finally free or always cohering, valvate. Stamens 8, 2-seriate, inserted below disk prominent between them; alternipetalous usually shorter; filaments free esquamate; anthers exserted, introrsely 2-rimose. Germens 4, oppositipetalous free, 2-ovulate (of *Zieria*); styles afterwards coalescing in elongated filiform erect column, entire or 4-lobed stigmatiferous at apex. Cocci 4, truncate (of *Boronia* or *Nematolepis*).—Small trees or shrubs, stellate pubescent, densely tomentose or pulverulent, sometimes subglabrous; leaves opposite petiolate simple pellucid-punctuate; flowers[4] terminal, solitary or in few-flowered cymes (often 3), axillary to twigs, short often terminal, sometimes pendulous (*Australia*[5]).

37. **Urocarpus** J. Drumm.[6]—Flowers nearly of *Phebalium* (or *Eriostemon*); calyx very short subentire, sometimes almost wanting or shortly 5-fid, valvate. Petals 5, valvate. Stamens 10, 2-seriate, or more rarely 11–15; filaments free slender; anthers naked at apex, introrsely or laterally rimose. Germen 1, shortly lobed or truncate; cells 2, 3, or more rarely 5 (*Asterolasia*[7]); ovules in each cell 2, oblique, descending or afterwards ascending; style inserted between lobes of germen, slender stigmatiferous capitate lobed or peltate at

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[1] Red, somewhat similar to *Correa*.

[2] Spec. 1. *N. phebaloides* Turcz., *loc. cit.*—Benth., *Fl. Austral.*, i. 356.—*Symphyopetalum correoides* J. Drumm., *loc. cit.*—Walp., *Ann.*, iv. 407.

[3] In *Trans. Linn. Soc.*, iv. 219 (1798).—DC., *Prodr.*, i. 719.—A. Juss., in *Mém. Mus.*, xii. 478, t. 21, fig. 22.—Spach, *Suit. à Buffon*, ii. 335.—Endl., *Gen.*, n. 6012.—B. H., *Gen.*, 294, 990, n. 41.—*Maxeuloxeron* Labill., *Voy.*, ii. 11.—*Correas* Hoffmans., *Verz.*, 168.—*Antomarchia* Coll., *Hort. Ripul.*, App., ii. 345.—*Didymeria* Lindl., in *Milch. Tr. Exp.*, ii. 198.

[4] Usually handsome, pendulous, white, yellow, virescens, or red; sometimes 2-coloured.

[5] Spec. 5, 6, of which cultivated var. numer. Vent., *Malmais.*, t. 13.—Sweet, *Fl. Austral.*, t. 1,—Hook., *Icon.*, t. 2, 3.—F. Muell., *Fl. Vict.*, i. 135.—Benth., *Fl. Austral.*, i. 353.—*Bot. Mag.*, t. 1746, 1901, 4029, 4912.—*Bot. Reg.*, t. 26, 1224.—Walp., *Rep.*, i. 505; ii. 824; v. 390; *Ann.*, i. 155; vii. 524.

[6] In *Hook. Kew Journ.*, vii. 54 (1855).—B. H., *Gen.*, 294, n. 39.

[7] F. Muell., in *Hook. Kew Journ.*, viii. (1856), 34 (part.).—B. H., *Gen.*, 294, 990, n. 40 (part.).—Sect. *Euasterolasia* Benth., *Fl. Austral.*, i. 350.

apex. Fruit capsular, at base 2–5-locular; cocci free at apex obtuse, produced in cornutus; endocarp solubile. — Stellate-tomentose or squamulose undershrubs; leaves alternate simple coriaceous entire punctuate; flowers[1] solitary or cymose-subumbellate, axillary or subterminal (*Australia*[2]).

38. **Pleurandropsis** H. Bn.[3]—Flowers hermaphrodite without sepals; receptacle short conical. Petals 5, shortly unguiculate, induplicate-valvate. Stamens 10–15, inserted with petals; filaments free filiform very unequal; anthers oblong introrse. Carpels 5, free oppositipetalous; germens connivent, outwardly densely stellate-hirsute closely contiguous (not connate); styles same in number more or less coherent at internal angle, at apex free reflexed thick subclavate patent, interior densely tuberculate-papillose. Ovules in each germen 2, descending; one sometimes aborting; micropyle extrorse superior. "Fruit cocci 5, tomentose"?—A rigid densely stellate-tomentose or woolly shrub; leaves alternate simple obtuse or truncate rather thick; flowers[4] terminal or falsely axillary,[5] solitary or very few together; leaves of superior branches and bractlets very small few or sometimes 0, involucre of flowers and calyx taking their place (*Australia*[6]).

39. **Chorilæna** Endl.[7]—Flowers nearly of *Boronia* (or *Philotheca*); sepals 5, and petals same in number longer narrow-elongated. Stamens 10, much longer than perianth; filaments filiform, inwardly long enlarged with scales; anthers oblong introrse. Gynæceum (5-merous), fruit and other characters of *Boronia* (or *Philotheca*).—Shrubs with stellate long hispid hairs; leaves alternate petiolate sinuate-lobed; flowers in pedunculate axillary cymes; central 1 or few subsessile; exterior pedicellate; pedicels 2-bracteolate, dense, bractlets equal or longer than sepals (*Western Australia*[8]).

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[1] Small, whitish; petals sometimes outwardly stellate-pilose.

[2] Spec. 7, 8. A. Juss., in *Mém. Soc. Hist. Nat. Par.*, ii. 130, t. 10 (*Phebalium*). — F. Muell., in *Trans. Vict. Inst.*, i. 34 (*Phebalium*); *Fragm.*, i. 105; *Pl. Vict.*, i. 232 (*Eriostemon*).—Hook., *Icon.*, t. 727 (*Phebalium*).—Benth., *Fl. Austral.*, i. 349 (*Asterolasia*, part.).—Walp., *Ann.*, iv. 407; vii. 523 (*Asterolasia*, part.).

[3] In *Adansonia*, x. 305.

[4] Pale yellow.

[5] Properly terminating the very short axillary branchlets, whose few approximate leaves have been taken for a calyx.

[6] Spec. 1. *P. phebalioides* H. Bn., *loc. cit.*, 306.—*Asterolasia phebalioides* F. Muell., in *Trans. Phil. Soc. Vict.*, i. 10.—Benth., *Fl. Austral.*, i. 351.—*Eriostemon pleurandroides* F. Muell., *Fragm.*, i. 106; *Pl. Vict.*, i. 133.

[7] In *Hueg. Enum.*, 17; *Gen.*, n. 6010.—B. H., *Gen.* 295, 990, n. 43.

[8] Spec. 2. Benth., *Fl. Austral.*, i. 357.—Walp., *Ann.*, vii. 524.

40. **Diplolæna** R. Br.[1]—Flowers nearly of *Chorilæna*, without sepals; petals 5, squamiform, naked or ciliate. Stamens 10, 2-seriate, disk, gynæceum, and fruit of *Chlorilæna*.—Shrubs, with stellate tomentose hairs; leaves alternate petiolate, linear or oblong entire glandular-punctuate; flowers small in axillary pedunculate nutant capitula (simulating flowers), inflorescence densely crowded and sessile on flat receptacle; bracts ∞, imbricated in involucre round flowers; exterior shorter pubescent or tomentose; interior petaloid (simulating corolla) larger (*South-West Australia*[2]).

V. ZANTHOXYLEÆ.

41. **Zanthoxylum** L.—Flowers polygamous-diœcious; receptacle short convex. Sepals 2–6 (or more rarely 0), more or less high connate, imbricated. Petals same in number (or sometimes 0), imbricate or induplicate-valvate. Stamens equal in number to petals (in female flower effete, rudimentary or 0); filaments inserted below disk (in male flower minute or 0, in hermaphrodite female longer produced); anthers introrsely 2-rimose. Gynæceum (in male flower rudimentary, simple or 2–5-partite) 1–5 carpels or more rarely 6–8 oppositipetalous and constant; germens 1-locular free or very rarely (*Perijæa*) connate in plurilocular ovary; ovules in each 2, inserted at the internal angle, descending; micropyle extrorse superior; styles apical or inserted at a greater or less height at internal angle of germen, more or less elongated, free or more or less joined among themselves; apex stigmatiferous rather thick. Fruit of 1–5 cocci, or very rarely plurilocular, loculicidal capsular; cocci often drupaceous glandular, usually 2-valved; endocarp sometimes solute. Seeds oblong or subglobose widely umbilicate, at maturity pendent by filiform funicle; testa hard, usually crustaceous black; albumen fleshy oily; embryo axile straight or curved; cotyledons foliaceous flat; radicle short superior.—Trees or shrubs, glabrous or pubescent, unarmed spinescent or straight recurved and bristly aculeate; leaves alternate 1–∞-foliolate usually imparipinnate;

[1] In *Flind. Voy.*, ii. 546.—Desf., in *Mém. Mus.*, iii. 450, t. 19, 20.—DC., *Prodr.*, i. 719.—A. Juss., in *Mém. Mus.*, xii. 479.—Endl., *Gen.*, n. 6011.—B. H., *Gen.*, 295, 990, n. 44.

[2] Spec. 4. Bartl., in *Pl. Preiss.*, i. 173.—Hook., in *Bot. Mag.*, sub n. 4059.—Benth., *Fl. Austral.*, i. 358.

folioles often opposite, like the whole plant pellucid-punctuate, aromatic; flowers in axillary or terminal racemes, sometimes spiciform, oftener ramified cymiferous; pedicels usually articulate (*All Tropical and Subtropical Regions, rarely Temperate*). See p. 396.

42. **Evodia** Forst.[1]—Flowers hermaphrodite or polygamous, 4, 5-merous (nearly of *Zanthoxylon*); sepals decussate-alternate or quincuncially imbricated, persistent. Petals 4, 5, much larger, valvate or subvalvate. Stamens double in number to petals (*Melicope*,[2] *Pelea*[3]), or equal (*Euevodia*,[4] *Boninia*[5]), inserted below disk, much varied in form (either subentire, more or less adnate to carpels, or 4, 5-lobed; lobes more or less prominent between stamens), either all fertile, or sometimes but very rarely oppositipetalous, sterile (*Brombya*[6]) and much smaller than fertile. Germen free; cells 4, 5, oppositipetalous, entirely (*Melicope*, *Euevodia*) or at apex only (*Pelea*, *Boninia*, *Boymia*[7]) free; style inserted at apical depression of germen, stigmatiferous 4, 5-lobed at apex; ovules in cells 2, descending; micropyle extrorse, superior. Other characters of *Zanthoxylon*. Carpels in fruit free, dry, 1, 2-valved, or capsule 4, 5-locular, with base of stamens and calyx stipate at base, loculicidal from apex, scarcely to middle; endocarp separating; seeds oblong; testa thick black; embryo albuminous; cotyledons elliptical; radicle superior.—Trees or shrubs; leaves opposite or sometimes (*Pelecastrum*[8]) alternate, petiolate, simple, punctuate, penninerved; flowers in terminal and axillary bracteate

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[1] *Char. Gen.*, t. 7 (nec Gærtn.).—Lamk., *Dict.*, ii. 38; Suppl., ii. 292; *Ill.*, t. 811.—DC., *Prodr.*, ii. 88, 90.—A. Juss., in *Mém. Mus.*, xii. 484, t. 22, fig. 28.—Endl., *Gen.*, n. 5996.—B. H., *Gen.*, 296, 994, n. 46.—H. Bn., in *Adansonia*, x. 325 (incl.: *Astorganthus* Endl., *Aubertia* Bory, *Boninia* Pl., *Boymia* A. Juss., *Brombya* F. Muell., *Entoganum* Banks, *Lepta* Lour., *Megabothrya* Hance, *Melicope* Forst., *Pelea* A. Gray, *Philagonia* Bl., *Tetradium* Lour.).

[2] *Char. Gen.*, t. 28.—J., *Gen.*, 429, 453.—DC., *Prodr.*, i. 723.—Endl., *Gen.*, n. 5995.—B. H., *Gen.*, 295, 990, n. 45.—*Entoganum* Banks, in *Gærtn. Fruct.*, i. 331, t. 68.—*Astorganthus* Endl., mss. (ex Hook., *Icon.*, t. 585).—*Aubertia* Bory, *Voy.*, i. 356.

[3] A. Gray, in *Unit. St. Explor. Exp., Bot.*, i. 339, t. 35–38.—H. Bn., in *Adansonia*, x. 321.

[4] F. Muell., *Fragm.*, v. 4.—B. H., *Gen.*, 991, n. 45 *a*.

[5] Of which section are *Evodia* (Forst.) and *Lepta* Lour., *Fl. Cochinch.*, 82, *Ampacus* Rumph., *Herb. Amboin.*, ii. 186, t. 62 (cfr. Tr. & Pl., in *Ann. Sc. Nat.*, sér. 5, xiv. 308, not.).

[6] Pl., in *Ann. Sc. Nat.*, sér. 5, xiv. 309.—H. Bn., in *Adansonia*, x. 325.

[7] A. Juss., in *Mém. Mus.*, xii. 507, t. 25, fig. 39.—Sieb. & Zucc., *Fl. Jap.*, i. 50, t. 21.

[8] Leaves also imparipinnate in *Philagonia* Bl., *Bijdr.*, 250 (*E. Roxburghiana*), *Megabothrya* Hance, in *Walp. Ann.*, ii. 259 (*E. meliæfolia*) and in *Tetradio* Lour., *Fl. Cochinch.*, 91 (*E. fraxinifolia*), whose germen, seated on the glandular disk, is plurilocular at the base (as in *Pelea* and *Boymia*) on account of the slightly connate carpels.

cymes[1] (*Trop. Asia, Ind. and Pac. Archipelago, Australia, N. Zealand, N. Caledonia, Mascaren. Isles, Malasia*[2]).

43. **Bouchardatia** H. Bn.[3]—Flowers (nearly of *Evodia*), 4-merous; calyx short, imbricated. Petals longer, imbricated. Stamens 8, inserted with perianth towards base of elongated obpyramidal receptacle; filaments dilated at base, subpetaloid; anthers introrse, 2-rimose. Carpels 4, oppositipetalous, inserted at summit of receptacle; germen free; ovules in each about 12, 2-seriate, descending; styles inserted slightly below apex at internal angle of germen, afterwards coalescing in conoid column, stigmatiferous, scarcely capitate at apex. Mature carpels free, folliculiform, dehiscent; endocarp curved, veined, separating; seeds few, albuminous. —A small glabrous tree; leaves opposite, petiolate, pinnate, 3-foliolate; terminal foliole long petiolulate; flowers[4] in opposite-ramified terminal cymes (*North-eastern Australia*[5]).

44. **Bosistoa** F. Muell.[6]—Flowers hermaphrodite; calyx short, gamophyllous, 5-dentate. Petals 5, valvate, inflexed at apex; stamens 10, 2-seriate, inserted below disk, and prominent between filaments dilated at base; anthers rather large, introrsely 2-rimose. Carpels 5, oppositipetalous, free; germens in internal angle 5, 6-ovulate; ovules 2-seriate, descending; micropyle extrorse, superior; styles inserted at summit of internal angle of germen, afterwards slightly cohering among themselves, finally solute, stigmatiferous, not dilated at apex. Fruit cocci 1–5, large, free, coriaceous, compressed, 2-valved; endocarp cartilaginous, separating; seeds solitary; testa membranous; embryo exalbuminous; cotyledons thick, fleshy; radicle

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[1] A genus scarcely distinguished from *Zanthoxylon*, except by very artificial characters. From the peculiar configuration of the receptacle and disk we can find no good generic distinction.

[2] Species about 50 (more or less known, of which some are simple leaved, described as belonging to Eastern Ins. and warm South Africa). Labill., *Sert. Austro-Caled.*, t. 74. —Endl., *Prodr. Fl. Norfolk.*, 86.—A. Cunn., in *Ann. Nat. Hist.*, iii. 315 (*Melicope*).—Schott, *Rutac.*, t. 1.—Nees, in *Flora* (1825), 125 (*Philagonia*.—Hook., *Icon.*, t. 603 (*Melicope*, 710 (*Philagonia*).—Benth., *Fl. Hongkong.*, 58; *Fl. Austral.*, i. 359 (*Melicope*), 361. —F. Muell., *Fragm.*, i. 28; ii. 102.—A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 332, 349, i. 39 (*Melicope*).—Hook. f., in *Trans. Linn. Soc.*, xxiii. 166.—H. Bn., in *Adansonia*, x. 322 (*Pelea*), 326.—Walp., *Rep.*, i. 500 (*Melicope*), 522, 523; v. 387 (*Melicope*); *Ann.*, iv. 410 (*Melicope*), 415, 417; v. 397; vii. 525.

[3] In *Adansonia*, vii. 347, t. 10; ix. 109.

[4] Small, crowded.

[5] Spec. 1. *B. neurococca* H. Bn., *op. cit.*, ix. 110.—*B. australis* H. Bn., *op. cit.*, vii. 351.—*Erodia neurococca* F. Muell., *Fragm.*, i. 28; ii. 103.—*Melicope neurococca* Benth., *Fl. Austral.*, i. 360.—Walp., *Ann.*, vii. 525.

[6] Ex Benth., *Fl. Austral.*, i. 359.—B. H., *Gen.*, 990, n. 45 *a*.—H. Bn., in *Adansonia*, x. 328.

small.—A glabrous tree ;[1] leaves opposite, pinnate ; folioles largely serrate or subentire, pellucid-punctuate ; flowers in cymiferous racemes, often 2-chotomous[2] (*Eastern Australia*[3]).

45. **Pagetia** F. Muell.[4]—Flowers (nearly of *Evodia*) 5-merous; petals subvalvate. Stamens 10, inserted below annular disk ; filaments free, linear-subulate ; anthers cordate-ovate. Germen 5-sulcate ; styles 5, short, contorted in one ; stigmas minute, coalescing ; ovules in cells 4–6. Cocci 5, distinctly 2-valved ; endocarp separating.—A tree ; leaves opposite, petiolate, simple, or 2, 3-foliolate ; folioles ovate or cordate, unequal at base, coriaceous, glabrous, penninerved, veined ; terminal buds subglobose ; flowers[5] in ramified 3-chotomous terminal cymes (*Eastern and Subtropical Australia*[6]).

46. **Choisya** H. B. K.[7] — Flowers hermaphrodite ; receptacle thickly convex. Sepals 5, imbricated, deciduous. Petals same in number, alternate, longer, patent, imbricated. Stamens 10, of which 5 oppositipetalous are shorter; filaments free, subulate, inserted below glandular disk ; anthers introrse, 2-rimose. Carpels 5, oppositipetalous ; germen free, base immersed in thick disk, outwardly dorsally produced in erect cone ; styles same in number, inserted at internal angle of ovary, afterwards coalescing among themselves in an erect column, stigmatiferous, obtusely lobed, dilated at apex ; ovules in each germen 2, descending ; micropyle extrorse, superior. Cocci 5, 2-valved ; endocarp solute ; seeds . . . ?—A glandular-punctuate shrub (very fragrant) ; leaves opposite, petiolate, exstipulate, 3-foliolate ; petioles and folioles articulate at base ; flowers[8] in cymes terminal or axillary to the upper leaves, 2, 3-chotomous, ramified ; pedicels articulate at base, bracteolate (*Mexico*[9]).

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[1] Habit of *Cupania*.

[2] Genus differing from *Bouchardatia* in leaves pinnate, not 3-foliolate, flowers 5- not 4-merous ; petals valvate, disk prominent between stamens, not (like some *Quassias*, as noted in *Adansonia*, vii. *loc. cit.*) obconical, ovules in carpels 4, 5, and cocci large.

[3] Spec. 1. *B. pentacocca*.—*B. sapindiformis* F. Muell., *Herb.* (ex Benth.). — *Evodia pentacocca* F. Muell., *Fragm.*, iii. 41. — *Aeradenia Bosistoi* F. Muell., *op. cit.*, vi. 167.

[4] *Fragm. Phyt. Austral.*, v. 178.—B. H., *Gen.*, 991, n. 50 *b*.

[5] Small, white.

[6] Spec. 1. *P. medicinalis* F. Muell., *loc. cit.*

[7] *Nov. Gen. et Spec.*, vi. 4, t. 513.—DC., *Prodr.*, i. 724.—A. Juss., in *Mém. Mus.*, xii. 490.—Endl., *Gen.*, n. 6001.—B. H., *Gen.* 297, n. 50. — *Juliana* Llav. & Lex., *Nov. Gen. Descr.*, ii. 4.

[8] Rather large; white, handsome.

[9] Spec. 1. *C. ternata* K., *loc. cit.*

47. **Medicosma** Hook f.[1]—Flowers 4-merous; sepals 4, decussately imbricated, deciduous. Petals 4, sessile, finally recurved-patent. Stamens 8, 2-seriate, inserted below thick pulvinate 4-lobed disk; oppositipetalous, shorter; filaments free, widely subulate, robust glandular-verrucose, connivent in cone, margins woolly, connivent; anthers oblong-ovate, introrse, 2-rimose. Carpels 4, oppositipetalous, sessile; germens free; ovules in each 2, descending; micropyle extrorse, superior; styles 4, shortly coalescing in one, slender, stigmatiferous 4-lobed at apex. Fruit cocci 4, tomentose; endocarp separating, 2-valved.—A glabrous shrub; leaves opposite, petiolate, simple (or 1-foliolate?) glandular-punctuate; flowers[2] in few-flowered, axillary cymes; pedicels bracteolate (*Eastern Australia*[3]).

48. **Platydesma** H. Mann.[4]—Flowers nearly of *Medicosma;* sepals 4, decussately imbricated; exterior 2 larger. Petals same in number, alternate, contorted, finally recurved at apex. Stamens 8, 2-seriate, inserted below slightly 8-lobed disk; filaments subpetaloid; anthers subsagittate, introrse, 2-rimose, inserted inside filaments, subadnate. Germen deeply 4-sulcate, 4-locular; cells oppositipetalous; connate only at internal angle; style central, short, stigmatiferous at apex; ovules in each cell 4–6, inserted at internal angle, descending. "Cocci erect, discrete, succulent, often 1-spermous by abortion; endocarp thin, cartilaginous; seed . . . ?"—Small trees, subglabrous (graveolens); leaves opposite, simple, obovate-lanceolate, petiolate; cymes[5] axillary, few-flowered; pedicels 2-bracteolate (*Sandwich Islands*[6]).

49. **Dutaillyea** H. Bn.[7]—Flowers hermaphrodite; receptacle shortly conical. Sepals 4, valvate, at first slightly decussate. Petals same in number, alternate longer, contorted or oftener (sometimes decussately) imbricated. Stamens 4, alternipetalous; filaments free, subulate, inserted at base of glandular-thickened and obscurely-lobed

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[1] *Gen.*, 296, 991, n. 48.

[2] Rather large, handsome, white, pubescent.

[3] Spec. 1, culta. *M. Cunninghami* Hook. f., *loc. cit.*—Benth., *Fl. Austral.*, i. 362.—*Acronychia Cunninghami* Hook., in *Bot. Mag.*, t. 3994.—H. Bn., in *Adansonia*, ii. 253.—Walp., *Rep.*, ii. 825.—*Evodia Cunninghami* F. Muell., *Fragm.*, iii. 2.

[4] In *Proceed. Bost. Soc. Hist. Nat.*, x. 317.—B. H., *Gen.*, 991, n. 50 *a*.

[5] Flowers large, "white."

[6] Spec. 1. *P. campanulata* H. Mann., *loc. cit.*

[7] In *Adansonia*, x. 327.

germen; anthers oblong, longer than filaments, introrsely 2-rimose. Germen free, conoid; style apical simple; apex stigmatiferous, not thickened; cells 4, oppositipetalous; ovules in each 2, descending; micropyle extrorse, superior. Fruit . . .?—A shrub; leaves opposite, petiolate, digitate, 3-foliolate; folioles petiolulate, entire, coriaceous, penninerved; flowers rather large in compound axillary cymes[1] (*N. Caledonia*[2]).

50. **Astrophyllum** Torr. & Gr.[3]—Flowers hermaphrodite; 4, 5-merous; receptacle concave? Sepals and petals same in number, alternate, perigynous (?), valvate. Stamens 8, 10, 2-seriate; filaments subulate; anthers ovate. Germen surrounded by 8–10-lobed, little conspicuous disk; lobes 4, 5, incurved above; style ventral, free at base, coalescing at apex, oblong-5-sulcate, stigmatiferous; ovules in cells 2, collateral. "Cocci (aborted 2) coriaceous, dorsally apiculate, with base of style rostrate; endocarp cartilaginous, solute, 2-valved. Seeds ovate-globose; testa nitid, black; albumen fleshy, scanty; embryo curved; cotyledons large; radicle short."—A humble much ramified shrub, all prominently glandular-verrucose;[4] leaves subopposite, petiolate, digitate 5–10-foliolate; flowers axillary and terminal, solitary or subumbellate, long pedicellate[5] (*N. Mexico*[6]).

51. **Peltostigma** Walp.[7]—Flowers hermaphrodite; receptacle thick, rather convex; perianth 8-leaved, very unequal, generally spirally inserted, closely imbricated; exterior 4,[8] narrower and shorter, greenish; interior much larger, petaloid.[9] Stamens ∞, slightly longer than perianth, and spirally inserted, free; anthers introrse, 2-rimose. Carpels 8, inserted at summit of receptacle, alternating with leaves of perianth; germens free; ovules in each 2, descending; micropyle extrorse, superior;[10] styles slender, inserted

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[1] A genus by gynæceum allied to *Acronychia*, germen one plurilocular; differs especially in the number of stamens.

[2] Spec. 1. *D. trifoliata* H. Bn., *loc. cit.*

[3] In *Pope Exped., Bot.*, 5.—B. H., *Gen.*, 296, n. 47.

[4] Afterwards graveolens.

[5] A genus very little known to us. Younger flowers (seen by us, perhaps belonging to another plant) seem to belong to *Rutaceæ*; but concerning the very perigynous insertion and the concave receptacle observed in them by us, authors are silent; hence doubtful. (Vid. p. 400, not. 1).

[6] Spec. 1. *A. dumosum* Torr. & Gr., *loc. cit.*—Torr., in *Emor. Rep., Bot.*, 42.—Walp., *Ann.*, vii. 526.

[7] *Rep.*, v. 387.—B. H., *Gen.*, 300, n. 61. — *Pachystigma* Hook., *Icon.*, t. 698 (nec Rafin.).

[8] "Sepala" (Hook.).

[9] "Petala" (Hook.)

[10] Double coats.

at internal angle of germen above the middle, afterwards cohering among themselves in a thick, obovoid, stigmatiferous mass, reflexed, thickened at apex. Fruit cocci 8, rostrate at apex, 2-valved; endocarp solute; seeds oblong; embryo . . . ?—A small glabrous tree, glandular-punctulate, and fragrant; leaves alternate, petiolate, 3-foliolate, punctulate; flowers[1] in long pedunculate axillary cymes, often 2, 3-chotomous, few-flowered; pedicels foliaceous, bracteate[2] (*Jamaica*[3]).

52? **Melanococca** Bl.[4]—Flowers hermaphrodite; receptacle short. Calyx short, 5, 6-fid, valvate, persistent. Petals same in number, obtuse. Stamens 5, 6, alternipetalous, outwardly inserted below thick depressed annular disk; filaments free, short; anthers introrse, 2-rimose. Carpels 5, 6, more or less coherent by short laterally stigmatiferous styles; ovules in each germen solitary. Drupes 1–4, oblique, globose, succulent; putamen unequally lenticular, bony, tuberculate or rugose. Seed compressed-reniform, sinuous umbilicate; testa membranous; albumen thin; embryo curved; cotyledons subovate, flat; radicle cylindrical, ascending, slightly shorter.—A small tree, simply ramified; branches, leaves, and inflorescence tomentose; leaves alternate, imparipinnate; folioles 4–7-jugate, subopposite, entire, epunctuate, veined; flowers in axillary and terminal ramified panicles[5] (*N. Guinea*[6]).

53. **Comeurya** H. Bn.[7]—Flowers hermaphrodite (?); receptacle shortly cupuliform or pateriform, inwardly clothed with obscure crenate disk. Sepals 5, imbricated, and petals same in number, alternate, longer, at apex slightly imbricated or contorted, inserted at margin of receptacle. Stamens 10, 5 are oppositipetalous, shorter, inserted with perianth; filaments filiform; anthers introrse, linear-oblong, versatile, 2-rimose. Carpels 5, oppositipetalous, free; germens

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[1] Whitish-lutescent, rather large, fragrant.

[2] A genus made into an order as a very anomalous medium between *Rutaceæ* and *Ochnaceæ*, on account of the spiral insertion of the leaves of perianth and the indefinite number of stamens. All parts of the plant glandular and odoriferous.

[3] Spec. 4. *P. pteleoides* Walp., *loc. cit.*—*Pachystigma pteleoides* Hook., in *Bot. Mag.*, t. 4470.

[4] *Mus. Lugd.-Bat.*, i. 236 (*Anacardiaceæ*).—B. H., *Gen.*, 298, n. 52.

[5] A genus, on account of little known flowers very uncertain, "characterib. permult. *Zanthoxylo* quadrat" (B. H.), but with inodorous and epunctuate leaves. It also seems to bear some affinity to the *Eurycomæ* among the *Simarubeæ* as to the structure of leaves and flowers, but the plant is not bitter. Flowers generally polygamous, pericarp epunctuate. Chiefly from description of Blume.

[6] Spec. 1. *M. tomentosa* Bl., *loc. cit.*

[7] In *Adansonia*, x. 329.

stipitate, short, inserted together and connate among themselves at base, 1-locular, afterwards free and tapering in an equal number of styles, cohering among themselves, slightly thickened, reflexed, stigmatiferous at apex ; ovules (fertile ?) in each cell solitary or rarely 2-nate, descending ; micropyle extrorse, superior. Fruit . . .?—A tree (?) ; leaves alternate (?), imparipinnate ; folioles opposite, very short, petiolate, ovate-oblique, tomentose, epunctuate, insipid ; flowers in much ramified terminal cymiferous racemes ; pedicels articulate (*Manilla*[1]).

54. **Decatropis** Hook. f.[2]—Flowers hermaphrodite ; receptacle subcylindrical. Calyx inserted on receptacle, short, cupuliform, 5-dentate, rather thick, villous, immersed in wool. Petals 5, inserted with calyx, lanceolate, patent membranous, valvate, at apex acute inflexed. Stamens 10, inserted with perianth, the 5 oppositipetalous shorter ; filaments free, subulate ; anthers subcordate, introrse, 2-rimose. Carpels oppositipetalous 5, inserted at summit of receptacle, free ; germens dorsally longitudinally sulcate, laterally 2-carinate ; styles short slender, thick obconical stigmatiferous at apex, coherent among themselves ; ovules in each ovary 2, collaterally ascending ; micropyle extrorse. Fruit . . .?—A tree (?) ; branches terete ; twigs, petioles, and leaves below densely velutinate-tomentose ; leaves alternate, imparipinnate ; petiole terete ; folioles 4, 5-jugate, opposite, thickly petiolulate, oblong or linear-lanceolate, entire, coriaceous, impressed-punctulate ; flowers[3] in large much ramified axillary glomeruliferous racemes (*Mexico*[4]).

55. **Polyaster** Hook. f.[5]—Flowers hermaphrodite ; receptacle depressed conical. Sepals 5, small, imbricated. Petals same in number, alternate, sub-3-agonal, valvate. Disk thick, glandular-punctuate, obscurely 10-lobed, prominent between stamens. Stamens 10, 2-seriate, inserted below disk ; filaments subulate, pilose ; anthers introrse, sub-2-dymous, 2-rimose. Carpels 5, oppositipetalous ; germens free ; styles short, coalescing in rather thick column, at apex stigmatiferous, 5-lobed, capitate ; ovules in germens 2, collaterally descending ; micropyle extrorse, superior. Fruit . . .?—An unarmed

[1] Spec. 1. *C. Cumingiana* H. Bn., *loc. cit.*
[2] *Gen.*, 298, n. 55.
[3] Small, crowded, white.
[4] Spec. 1. *D. Coulteri* Hook. f., *loc. cit.*
[5] *Gen.*, 299, n. 56.

shrub, pellucid-punctuate; leaves alternate, imparipinnate; rachis thinly winged; folioles opposite, ∞-jugate, linear-oblong, sessile, obtuse, entire; flowers small, in axillary or terminal subdichotomous or by abortion 1-parous, sometimes foliate, subsessile, ebracteolate (*Mexico*[1]).

56. **Megastigma** Hook. f.[2]—Flowers hermaphrodite; receptacle small, conical. Sepals 4, small, acute. Petals 4, longer, membranous, imbricated. Disk thick, sometimes subglobose, attenuated at base, fleshy-glandular. Stamens 8, inserted below disk, of which 4 are oppositipetalous, shorter; filaments free, glabrous; anthers subcordate, introrsely 2-rimose. Germen 2-locular, 2-dymous (or more rarely 3-locular); style short, afterwards dilated in large subglobose, obscurely 2, 3-lobed stigmatiferous head; ovules in each cell 2, subcollaterally descending; micropyle extrorse, superior. Fruit . . .?—Unarmed shrubs, glandular-punctuate, odoriferous; leaves alternate, imparipinnate; folioles ∞-jugate, subopposite; flowers[3] in compound cymiferous racemes; pedicels slender, bracteolate at base (*Mexico, Guatemala*[4]).

57. **Pilocarpus** Vahl.[5]—Flowers usually hermaphrodite; receptacle short, usually depressed. Calyx short, 4–5-dentate or subentire. Petals 4, 5, longer, 3-agonal, patent, reflexed, præfloration valvate or slightly imbricated. Stamens same in number, alternate; filaments inserted outside below annular often thick accrescent disk, free, subulate, incurved in bud; anthers short, rather wide, introrse, versatile, 2-rimose. Carpels 4, 5, oppositipetalous, free or connate at base, usually immersed in disk; styles same in number, free to a greater or less height, afterwards in erect column, stigmatiferous, capitate-5-lobed dilated at apex; ovules in each germen 2, subhorizontal or descendent; micropyle extrorse, superior. Cocci 4, 5, distinct, loculicidally 2-valved; endocarp solute, elastically 2-valved. Seeds usually solitary, ovoid; embryo exalbuminous, fleshy; radicle short, retracted between thick cotyledons. — Pellucid-punctuate

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[1] Spec. 1. *P. boronioides* Hook. f., *loc. cit.*
[2] *Gen.*, 299, n. 57.
[3] Small, white.
[4] Spec. 2. H. Bn., in *Adansonia*, x. 331.
[5] *Eclog.*, i. 29, t. 10.—DC., *Prodr.*, i. 728.—A. Juss., in *Mém. Mus.*, xii. 488, t. 22, fig. 29.—Spach, *Suit. à Buffon*, ii. 344.—Endl., *Gen.*, n. 5999.—A. S. H., in *Bull. Soc. Philom.* (1823), 130: *Pl. Rem. Brés.*, i. 145, t. 16; *Fl. Bras. Mer.*, i. 82, t. 17.—B. H., *Gen.*, 299, n. 59.

shrubs; leaves alternate, opposite or 3-nate, petiolate, 1–3-foliolate or imparipinnate; flowers in spikes or simple, much elongated racemes, terminal or axillary; pedicels below middle or at apex bracteolate (*Trop. and Subtrop. Cont. and Ins. America*[1]).

58. **Esenbeckia** H. B. K.[2]—Flowers nearly of *Philocarpus*, 4, 5-merous; petals imbricated or valvate (*Metrodorea*[3]). Stamens 4, 5, outwardly inserted below subentire disk, or between alternipetalous lobes; anthers short, often 2-dymous, mucronate. Carpels 4, 5, oppositipetalous, in 4, 5-locular germen more or less high, connate, dorsally at apex granulate or tuberculate; style inserted at summit of depressed germen, stigmatiferous capitate subentire or lobed at apex; ovules in cells 2, descending; micropyle extrorse, superior. Capsule subglobose or depressed, smooth (*Kuala*[4]) or oftener echinate or muricate, septicidally 5-coccous; cocci 2-valved; endocarp more or less solute, elastically 2-valved. Seeds oblong; hilum linear; thick cotyledons of exalbuminous embryoes often unequal, 2, 3; radicle superior, short. Other characters of *Philocarpus*.—Pellucid-punctuate trees or shrubs; leaves alternate, opposite, 1–3-foliolate; petiole flat or winged, sometimes dilated at base (*Metrodorea*), and including axillary bud; flowers[5] in ramified cymiferous racemes, axillary or terminal[6] (*Trop. and Subtrop. Cont. and Ins. America*[7]).

59? **Helietta** Tul.[8]—Flowers (nearly of *Esenbeckia*) 3, 4-merous; sepals connate at base, imbricated. Petals longer, imbricated, finally reflexed. Stamens equal in number to petals, outwardly inserted below concave 6–8-crenate disk, free; anthers at summit of reflexed

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[1] Spec. 5, 6. Nees & Mart., in *Nov. Act. Nat. Cur.*, xi. 176, t. 19.—Tul., in *Ann. Sc. Nat.*, sér. 3, vii. 284.—A. Gray, in *Unit. St. Expl. Exp., Bot.*, i. 331.—Griseb., *Fl. Brit. W.-Ind*, 135.—Tr. & Pl., in *Ann. Sc. Nat.*, sér. 5, xiv. 306.—Walp., *Rep.*, i. 501; *Ann.*, i. 154; iv. 411.

[2] *Nov. Gen. et Spec.*, vii. 246, t. 655.—A. Juss., in *Mém. Mus.*, xii. 486.—Schott, *Rutac.*, 13, t. 7.—Spach, *Suit. à Buffon*, ii. 343.—Endl., *Gen.*, n. 5997.—B. H., *Gen.*, 299, n. 69.—*Polembryon* A. Juss., in *Mém. Mus.*, xii. 519, t. 28.—*Colythrum* Schott, *Rutac.*, 9, 18, t. 5, fig. 7.

[3] A. S. H., *Fl. Bras. Mer.*, i. 81, t. 16.—A. Juss., in *Mém. Mus.*, xii. 487.—Endl., *Gen.*, n. 5998.—Payer, *Organog.*, 99, t. 22.

[4] Karst. & Tr., in *Linnæa*, xxviii. 429.

[5] Small, sometimes rather purple, nigrescent.

[6] A genus perhaps scarcely distinguished from *Pilocarpus* except by habit and character of inflorescence.

[7] Spec. ad 25. H. B. K., *Nov. Gen. et Spec.*, vii. 246, t. 655.—A. S. H., *Pl. Us. Bras.*, t. 4 (*Evodia*); *Pl. Rem.*, 149; *Fl. Bras. Mer.*, i. 79.—Mart., *Nov. Gen. et Spec.*, iii. 80, t. 232, 233.—Griseb., *Fl. Brit. W.-Ind.*, 135.—Turcz., in *Bull. Mosc.* (1858), i. 440.—Pohl., *Pl. Bras.*, ii. t. 128.—Nees, *Pl. Off.*, Suppl., t. 94.—Tr., in *Ann. Sc. Nat.*, sér. 5, xiv. 306.—Walp., *Rep.*, i. 501; *Ann.*, ii. 247; iv. 411; vii. 528, 529 (*Kuala*).

[8] In *Ann. Sc. Nat.*, sér. 3, vii. 280.—B. H., *Gen.*, 301, n. 66.

filaments finally extrorse, 2-rimose. Carpels 3, 4, oppositipetalous, inserted within disk; germens subfree, dorsally gibbous; styles coalescing in common column, at apex stigmatiferous capitate, 3–4-lobed; ovules in germens 2, finally ascending; micropyle introrse, inferior. Fruit cocci 3, 4, dry, ligneous, outwardly winged upwards, afterwards samaroid, and finally solute; seed elongated; embryo albuminous; cotyledons straight; radicle terete.—A rather glabrous small tree; leaves opposite, alternate, 3-foliolate; folioles obovate, obtuse, glandular-punctuate; flowers[1] in pedunculate ramified terminal and axillary cymes; pedicels 2-bracteolate (*N. Granada*[2]).

60. **Lunasia** Blanco.[3] — Flowers dicœcious, usually 3-merous. Sepals 3, sometimes connate at base, inserted on shortly conical receptacle. Petals 3, alternate, longer, valvate. Stamens 3, alternipetalous (in female flower sterile); filaments free, short; anthers short, introrsely 2-rimose. Germen free (in male flower rudimentary, minute); cells 3, oppositipetalous, afterwards dorsally produced in rather thick obtuse wing; style erect, 3-fid stigmatiferous at apex; ovule solitary in each cell, inserted at internal angle, descending; micropyle extrorse, superior. Fruit capsular, obpyramidal; cocci connate at internal angle, dorsally produced in wings, straight, truncate at apex (inwardly dehiscing ?). Seed solitary in each coccus, descending, oblong; embryo . . . ? — Furfuraceous-lepidote, pellucid-punctulate shrubs; branches angular; leaves alternate, long petiolate; petiole thick at apex; limb elongated, membranous, penninerved; male flowers small, in axillary capituliferous racemes; the female on alternate rachis solitary or in scanty glomerules (*Ind. Arch.*[4]).

61. **Hortia** Vandell.[5]—Flowers hermaphrodite; calyx obconically cupuliform, 5-dentate or 5-crenate. Petals 5, longer, free, coriaceous, inwardly barbellate at middle, valvate; apex reflexed. Stamens 5, alternipetalous, inserted round angular 5-lobed disk. Germen free, 5-locular; cells oppositipetalous; style short, conical,

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[1] Minute.

[2] Spec. 1. *H. Plœana* Tul., *loc. cit.*—Tr., in *Ann. Sc. Nat.*, sér. 5, xiv. 320.—Walp., *Ann.*, i. 158.

[3] *Fl. de Filip.*, 783. — Endl., *Gen.*, n. 5888³. — H. Bn., *Et. Gén. Euphorbiac.*, 668 (*Diosmeæ*).—Muell. arg., in *DC. Prodr.*, xv. sect. ii. 1259.—*Rabelaisia* Pl., in *Hook. Journ.*, iv. 519, t. 17, 18 (ex H. Bn., *loc. cit.*).—B. H., *Gen.*, 299, 991, n. 58.—*Mytilicoccus* Zoll., in Miq., *Fl. Ind.-Bat.*, i. p. ii. 387.

[4] Spec. 1, 2.

[5] Ex Vandell., in *Rœm. Script. Bras.*, 188.—DC., *Prodr.*, i. 732.—A. Juss., in *Mém. Mus.*, xii. 489, t. 22, fig. 30.—Spach, *Suit. à Buffon*, ii. 346.—Endl., *Gen.*, n. 6000.—B. H., *Gen.*, 301, n. 64.

5-sulcate, stigmatiferous at apex; ovules in each cell 2, descending, superposed; micropyle extrorse superior. Berry ovoid, 5-locular; pericarp resinous-lacunose; seeds in cells 1, 2, nidulant; outer coat pulpy; testa crustaceous; albumen fleshy; embryo axile, albuminous; cotyledons wide, membranous; radicle short, superior.—Glabrous trees or shrubs; leaves alternate, simple or 3-foliolate, coriaceous, minutely glandular-punctuate; flowers in much ramified terminal cymiferous racemes; twigs and pedicels thick, articulate (*Brazil*[1]).

62. **Acronychia** Forst.[2]—Flowers polygamous; receptacle shortly conical. Calyx short, usually 4-lobed, imbricated, sometimes accrescent after anthesis. Petals 4, longer than calyx, valvate, finally patent or revolute. Stamens 8, 2-seriate; filaments inserted outside below glandular conical disk, or 4–8-agonal from impressions of filaments, subulate, often ciliate; anthers introrse, 2-rimose. Germen free, often tomentose; style terminal, more or less elongated, at apex stigmatiferous, 4-sulcate or 4-lobed; cells 4, oppositipetalous; ovules in each cell 2, descending, subcollateral or superposed; micropyle extrorse, superior. Fruit dry or drupaceous, indehiscing or sometimes loculicidally 4-valved, more rarely at apex shortly 4-lobed, 4-agonal; testa black; albumen fleshy; embryo straight; cotyledons flat, oblong; radicle straight, superior.—Trees or small trees; leaves alternate or opposite, 1- or more rarely 3-foliolate; folioles entire, pellucid-punctuate; flowers[3] in ramified cymiferous racemes, sometimes corymbiform, axillary and terminal (*Trop. and Subtrop. Asia and Oceania*[4]).

63. **Halfordia** F. Muell.[5]—Flowers hermaphrodite (nearly of *Acronychia*), 5-merous; calyx short, cupuliform, 5-dentate. Petals

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[1] Spec. 2, 3. A. S. H., *Pl. Us. Bras.*, t. 17; *Fl. Bras. Mer.*, i. 80.

[2] *Char. Gen.*, 53, t. 27 (nec Hook.).—Schott, *Rutac.*, 3, t. 2, 3.—Endl., *Gen.*, n. 5978.—B. H., *Gen.*, 302, 992, n. 67.—*Jambolifera* L., *Gen.*, n. 479 (part.).—*Ankenda* Herm., *Mus.*, 73 (ex Endl.).—*Doriena* Dennst, *Hort. Malab.*, v. 15 (ex Endl.).—*Gela* Lour., *Fl. Cochinch.*, ed. olyssip. (1790), 232.—*Cyminosma* Gærtn., *Fruct.*, i. 280, t. 58.—DC., *Prodr.*, i. 722.—A. Juss., in *Mém. Mus.*, xii. 465, t. 17, fig. 11.—*Huonia* Montrous., in *Mém. Acad. Lyon*, x. 185.

[3] Whitish or yellowish, ordinary or small.

[4] Spec. ad 18. Labill., *Sert. Austro-caled.*, t. 65 (*Lawsonia*).—Wight, *Ill.*, 65 (*Cyminosma*).—Miq., *Fl. Ind.-Bat.*, Suppl., i. 532.—F. Muell., *Fragm.*, iv. 154; *Fl. Vict.*, i. 96.—A. Gray, *Unit. St. Expl. Exp., Bot.*, i. 233, t. 32–34.—Benth., *Fl. Austral.*, i. 366.—Walp., *Rep.*, i. 261 (*Cyminosma*), 523; ii. 815; *Ann.*, i. 159; iv. 416; vii. 530.

[5] *Fragm.*, v. 43, t. 36.—B. H., *Gen.*, 992, n. 67 *a*.—H. Bn., in *Adansonia*, x. 328.

5-valvate. Stamens 10, 2-seriate; filaments inserted below 10-costate disk, free, pilose or scantily granulose-glandular; anthers introrse, shortly apiculate, longitudinally rimose. Germen conical, 5-locular; cells oppositipetalous, 1-ovulate; ovule descending; micropyle extrorse, superior; raphe more or less long, free; style small, erect, 5-sulcate, minute, stigmatiferous at apex. Drupe dry, 3–5-locular; seeds solitary in cells; testa crustaceous; albumen fleshy; embryo straight; cotyledons foliaceous, slightly longer and wider than radicle. Other characters of *Acronychia*.—Glabrous shrubs; leaves alternate, simple, entire, penninerved, pellucid-punctuate; flowers small, in terminal ramified cymiferous corymbiform clusters[1] (*Australia, N. Caledonia*[2]).

64. **Skimmia** Thunb.[3]—Flowers polygamous-dicœcious, 4, 5-merous; receptacle short, convex. Sepals subfree or connate at base, imbricated. Petals longer, imbricated or subvalvate. Stamens alternating with petals, equal to them in number; filaments free; anthers (effete in female flowers) introrse, 2-rimose. Germen (rudimentary in male flower) surrounded by base of disk, lobed between stamens; cells 2–5;[4] style terminal, sometimes very short, at apex stigmatiferous, more or less dilated, 2–5-lobed. Ovule solitary in cell,[5] at internal angle, descending, anatropous; micropyle extrorse, superior.[6] Drupe glabrous;[7] mesocarp pulpy; pyrenas 2–5, scarious or cartilaginous. Seed solitary in pyrena, descending; albumen fleshy; embryoes $1-\infty$;[8] cotyledons oblong; radicle terete superior.—Glabrous evergreen shrubs, in all parts glandular-punctuate; leaves alternate, petiolate, simple, entire, coriaceous, exstipulate; flowers[9] in terminal ramified cymiferous racemes (*Centro-eastern Temp. Asia*[10]).

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[1] A genus certainly allied to *Skimma Aconychia* (of which perhaps it is a section), differing principally in number of floral organs and in solitary ovules.

[2] Spec. 1, 2.

[3] *Fl. Jap.*, 62.—J., *Gen.*, 425.—Gærtn. f., *Fruct.*, iii. 242, t. 225.—Poir., *Dict.*, vii. 221; Suppl., v. 161.—DC., *Prodr.*, ii. 18.—Endl., *Gen.*, n. 5712.—B. H. *Gen.*, 302, 992, n. 68.—*Laureola* Rœm., *Syn. Hesp.*, 74—*Anquetilia* Dcne., in *Voy. Jacquem., Bot.*, 161, t. 161.

[4] Alternating with stamens, equal in number to them.

[5] Ex A. Gray (fid. B. H., *Gen.*, 992), 1–5.

[6] Funicle short, thick; endostome rather long, tubular dilated beyond exostome.

[7] Outwardly glandular-punctuate, usually red.

[8] Whence many little plants spring from one pyrena (whence perhaps it has been considered polyspermous), as in most *Aurantieæ*, to which it is nearly allied.

[9] Congested, whitish or virescens, sometimes outwardly purplish, inodorous.

[10] Spec. 4, very varied. (Kæmpf., *Amœn.*, 779 (*Sin-San* v. *Mijama-Skimmi*).—Banks, *Icon. Kæmpf.*, t. 5.—DC., *Prodr.*, i. 536, n. 2 (*Limonia*).—Wall., *Pl. As. Rar.*, iii. t. 245.—Lem., in *Ill. Hort.* (1854), t. 13.—*Bot. Mag.*, t. 4719.—Walp., *Rep.*, i. 541; v. 104; *Ann.*, vii. 531.

65. **Casimiroa** Llav. & Lex.[1]—Flowers polygamous-dicœcious; receptacle depressed conical. Sepals usually 5, free or connate at base, narrow, imbricated. Petals same in number, alternate, valvate, incurved at apex. Stamens 5, alternipetalous; filaments inserted below, very small annular disk, free; anthers introrse, subcordate or subsagittate at base, longitudiually 2-rimose (in female flower smaller, effete). Germen (rudimentary in male flower) free, sessile, subglobose, cells 5, or more rarely 6–8; style short, thick, afterwards divided into a like number of thick reflexed stigmatiferous lobes; ovule in each cell 1, inserted at internal angle, descending; micropyle extrorse superior,[2] crowned with 2-lobed obturator. Drupe large, pomiform, depressed-globose; pulp sapid; pyrenas usually 5, crustaceous, 1-spermous; seeds oblong-compressed; hilum ventral, elongated; testa subcoriaceous; embryo exalbuminous; radicle short; cotyledons fleshy, amygdaloid.—Ramified trees; leaves alternate, digitate, 3–7-foliolate; folioles petiolulate, entire or slightly serrate, glabrous or pubescent, thinly pellucid-punctuate; flowers[3] in more or less ramified axillary cymiferous racemes[4] (*Mexico*[5]).

66. **Phellodendron** Rupr.[6]—Flowers dicœcious; sepals 5–8, free or connate at base. Petals same in number, alternate, inwardly at middle pilose-carinate, valvate, incurved at apex. Disk shortly columnar. Stamens (small, effete in female flower) equal in number to petals, and alternating with them; filaments short, subulate; anthers large, incurved, introrsely 2-rimose. Germen (rudimentary 5-lobed in male flower) 4, 5-locular; style . . .? ovules (solitary?) descending; micropyle extrorse superior. Drupe pisiform, 5-pyrenate; mesocarp oleose-lacunose;[7] seeds compressed; testa black, crustaceous; albumen fleshy, scanty; embryo rather straight; cotyledons flat, oblong; radicle superior.—A glabrous tree; leaves opposite, imparipinnate; folioles opposite, petiolate, articulate, oblong-lanceolate, acuminate, unequal at base, scantily pellucid-punctuate; flowers in compound terminal and axillary racemes, sometimes subcapitate; pedicels articulate (*Manchouria*[8]).

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[1] *Nov. Gen. Descr.*, fasc. ii. 2.—Endl., *Gen.*, n. 6879.—B. H., *Gen.*, 302, n. 69.

[2] Coats double; nucleus oblique.

[3] "Viridulis," small for plant.

[4] A genus remarkable for its involute cell, whence somewhat approaching the *Euphorbiaceæ*. The thick edible sarcocarp rare in the order.

[5] Seem., *Voy. Her. Bot.*, 273, t. 51, 52.

[6] In *Maak.*, 526, n. 16.—Maxim., *Primit. Fl. Amur.*, 72, t. 4.—B. H., *Gen.*, 301, 991, n. 63.—H. Bn., *Adansonia*, x. 330.

[7] Fragrance terebinthaceous.

[8] Spec. 1. *P. amurense* Rupr., *loc. cit.*—Walp., *Ann.*, vii. 530.

67? **Pitavia** Mol.[1]—Flowers polygamous or dicœcious; receptacle very convex. Sepals 4, connate at base, imbricated, deciduous. Petals 4, alternate, longer, imbricated. Stamens 8, inserted with perianth, 2-seriate; oppositipetalous shorter; filaments free, subulate; anthers ovate, introrse, 2-rimose. Gynæceum inserted at summit of much thickened glandular receptacle, beyond insertion of stamens; germens 4, free, oppositipetalous, dorsally glandular without; styles springing from internal angle of germen at a greater or less height, afterwards coalescing in column, 4-lobed, stigmatiferous at apex; ovules usually 2 (in male flower 1, 2, or by abortion 0), descending; micropyle extrorse. Drupes[2] 1–4, indehiscent; flesh thick; putamen thin, 1-spermous; seeds oblong; testa crustaceous; "albumen . . . (?); embryo straight; cotyledons oblong, foliaceous; radicle short."—A very glabrous tree; leaves opposite or 3-nate, shortly petiolate, simple, sinuate-crenate, subenerved, pellucid-punctuate, odoriferous; flowers in axillary cymes, ramified, bracteate and bracteolate, 2, 3-chotomous[3] (*Chili*[4]).

68. **Pentaceras** Hook. f.[5]—Flowers hermaphrodite; receptacle convex, produced beyond insertion of perianth and androceum in thick obconical column. Sepals 5, small. Petals same in number, alternate, much longer, glandular-punctuate, valvate. Stamens 10, inserted with petals, 2-seriate; oppositipetalous 5, shorter; filaments subulate, glabrous, finally exserted; anthers oblong, introrsely 2-rimose, caducous. Gynæceum placed at summit of receptacle; germens 5, free, oppositipetalous, apex produced in obtuse gland; ovules in each 2, superposed, descending; micropyle extrorse, superior; styles inserted at internal angle of germen, about middle, afterwards twisted into slender column, stigmatiferous, not thickened at apex. Fruit carpels 5, or fewer by abortion, subdrupaceous, produced on both sides in wide membranous nerved wing;[6] endocarp subligneous; seeds in each 1, 2; testa thick, glabrous;[7] albumen scanty, fleshy; embryo straight; cotyledons subovate.—A

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[1] *Chil.*, ed. 2, 287.—Don, in *Edinb. N. Phil. Journ.*, xiii. 241.—Endl., *Gen.*, n. 5969.—B. H., *Gen.*, 297, n. 49.—*Galvezia* R. & Pav., *Prodr.*, 56, t. 35; *Syst.*, i. 97.—A. Juss., in *Mém. Mus.*, xii. 500, t. 25, fig. 37.

[2] Very bitter.

[3] A genus much better placed among the *Simarubeæ* on account of the disk, and structure of gynæceum, differs by epunctuate leaves.

[4] Spec. 1. *P. punctata* Mol., *loc. cit.*—C. Gay, *Fl. Chil.*, i. 484.—Walp., *Rep.*, i. 519.—*Galvezia punctata* R. & Pav., *loc. cit.*

[5] *Gen.* 298, 991, n. 54.

[6] Whence recalling those of *Ailantus*.

[7] Nigrescent.

glabrous tree; leaves alternate, imparipinnate; leaves ovate-lanceolate, oblique at base, entire, much crowded, pellucid-punctulate; flowers small in axillary much ramified compound racemes; pedicels bracteolate below articulation (*Eastern and Subtrop. Australia*[1]).

69. **Ptelea** L.[2]—Flowers polygamous; receptacle more or less convex. Sepals 3–5, short, imbricated. Petals same in number, alternate, much longer, imbricated. Stamens same in number, inserted with petals and alternate with them; filaments free, more or less pilose; anthers introrse, 2-rimose, effete in female flower. Germen (rudimentary in male flower) inserted at summit of receptacle, more or less produced and dilated beyond insertion of androceum, 2, 3-locular; style short, stigmatiferous 2, 3-lobed at apex; ovules in each cell 2, descending; micropyle extrorse, superior.[3] Fruit dry, orbicular, widely 2, 3-winged, 2, 3-locular, indehiscent; seeds in each cell solitary from abortion, oblong; testa coriaceous; albumen fleshy; embryo straight; cotyledons flat, ovate-oblong; radicle short, superior.—Small trees or shrubs, more or less bitter; leaves alternate or more rarely opposite, exstipulate, 3-foliolate or pinnate 5-foliolate; folioles ovate, oblong or sublanceolate, entire, crenate or serrulate, pellucid-punctuate; flowers[4] in ramified cymiferous racemes, sometimes corymbiform (*Northern Temp. America*[5]).

70. **Toddalia** J.[6]—Flowers polygamous (nearly of *Zanthoxylon*); calyx 2–5-merous leaves lobed or dentate subequal. Petals 2, 5, longer, valvate or slightly imbricate. Stamens same in number

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[1] Spec. 1. *P. australis* Hook. f., *loc. cit.*—Benth., *Fl. Austral.*, i. 365.—*Cookia Australis* F. Muell., *Fragm.*, i. 25; iii. 27.—*Ailantus punctata* F. Muell., *op. cit.*, iii. 42.

[2] *Gen.*, n. 152.—Mill., *Icon.*, t. 211.—J., *Gen.*, 375.—Lamk., *Ill.*, t. 84.—Poir., *Dict.*, v. 706; Suppl., iv. 597.—Gærtn., *Fruct.*, i. 223, t. 49.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 355.—Turp., in *Dict. Sc. Nat.*, Atl., t. 128.—DC., *Prodr.*, ii. 82.—A. Juss., in *Mém. Mus.*, xii. 510, t. 26, fig. 42.—Spach, *Suit. à Buffon*, ii. 369.—Endl., *Gen.*, n. 5977.—Payer, *Organog.*, 107, t. 24,—A. Gray, *Gen. Ill.*, t. 157.—J. G. Ag., *Theor. Syst.*, t. 19, figs. 7, 8.—B. H., *Gen.*, 301, n. 65.—*Belluccia* Adans., *Fam. des Pl.*, ii. 344.

[3] Coats double.

[4] Flavo-virescens.

[5] Spec. ad 6. Torr. & Gr., *Fl. N.-Amer.*, i. 214.—A. Gray, *Man.*, ed. 5, 110.—Chapm., *Fl. S. Unit. St.*, 66.—Walp., *Rep.*, i. 523; ii. 259; *Ann.*, vii. 530.

[6] *Gen.*, 371.—Lamk., *Ill.*, t. 139.—Poir., *Dict.*, vii. 692; Suppl., v. 314.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 356.—DC., *Prodr.*, ii. 83.—A. Juss., in *Mém. Mus.*, xii. 508, t. 26, fig. 40.—Spach, *Suit. à Buffon*, ii. 368.—Endl., *Gen.*, n. 5975.—B. H., *Gen.*, 300, 991, n. 62 (part.).—*Boscia* Thunb., *Fl. Cap.*, 159 (nec Lamk.).—*Asaphes* DC., *Prodr.*, ii. 90.—*Duncania* Reichb., *Consp.*, 197.—*Vepris* Commers. (ex A. Juss., in *Mém. Mus.*, xii. 509, t. 26, fig. 41).—Endl., *Gen.*, n. 5976.—*Crantzia* Schreb., *Gen.*, 143 (nec Scop., nec Sw., nec Lag., nec Nutt.).—*Scopolia* Sm., *Ic. ined.*, ii. t. 34 (nec L., nec Forst., nec Jacq.).—*Dipetalum* Dalz., in *Hook. Kew Journ.*, ii. 38.

alternipetalous (sterile or 0 in female flower) inserted below disk; receptacle beyond insertion of androceum more or less elongated and dilated, in female flower often thick disciferous. Germen 2–8-locular[1] (in male flower rudimentary minute, 2–8-partite or subentire); style very short or more or less elongated, at apex stigmatiferous dilated, more or less lobed; ovules in cells 2, descending; micropyle extrorse superior; fruit fleshy or coriaceous subglobose punctuate, 2–8-locular; cells 1, 2-spermous. Seed subangular; testa coriaceous; albumen fleshy; embryo curved cotyledons oblong foliaceous or linear; shrubs often sarmentose, unarmed or aculeate; leaves alternate digitate 3-foliolate, or more rarely 4–∞-foliolate; folioles entire or crenate pellucid punctuate odoriferous; flowers[2] in more or less ramified cymiferous axillary and terminal racemes (*Trop. Cont. and Ins. Asia, South-East. Cont. and Ins. Africa*[3]).

VI. AMYRIDEÆ.

71. **Amyris** L. — Flowers hermaphrodite or polygamous; receptacle short conical. Calyx gamosepalous, 4-dentate, imbricated, persistent. Petals 4, longer, imbricated, patent at anthesis. Stamens 8, hypogynous; filaments free; the oppositipetalous shorter; anthers introrse, 2-rimose. Germen (rudimentary or sterile in male flower) surrounded at base by pulvinate or thickened disk (in male flower 0, or small), 1-locular; style terminal short, almost wanting, capitate stigmatiferous at apex; ovules 2, parietally inserted, collaterally descending; micropyle extrorse superior. Drupe globose or ovoid aromatic oily; putamen chartaceous, by abortion 1-spermous. Seed descending; testa membranous; embryo exalbuminous; cotyledons thick plano-convex punctuate; radicle superior short.— Trees or shrubs, in all parts glandular-punctuate resinous-aromatic; leaves alternate and opposite, 1–3-foliolate or imparipinnate exstipulate; petiole and rachis sometimes marginate; folioles opposite petiolulate entire or crenate; flowers in terminal and axillary

[1] Cells oppositipetalous, while the gynæceum is equal to the perianth.

[2] Small, whitish, lutescent, or virescent, sometimes odoriferous.

[3] Spec. about 5, very variable. Wall., *Pl. As. Rar.*, iii. 17, t. 232.—Wight & Arn., *Prodr.*, i. 149.—Wight, *Ill.*, t. 66.—Oliv., *Fl. Trop. Afr.*, i. 306 (part.).—Harv. & Sond., *Fl. Cap.*, i. 446.—Kl., in *Pet. Mos., Bot.*, i. 87 (*Vepris*).—Turcz., in *Bull. Mosc.* (1858), i. 413.—Walp., *Ann.*, vii. 529, 530 (*Vepris*).

ramified cymiferous bracteate racemes; pedicels bracteolate (*Trop. and Subtrop. Cont. and Ins. America*). See p. 403.

72. **Stauranthus** LIEBM.[1]—Flowers polygamous (?); calyx short, 4- or more rarely 5-dentate, persistent; teeth unequal acute. Petals same in number; alternate much longer rather thick valvate, or inflexed slightly imbricated at margin. Stamens equal in number to petals and alternate, filaments inserted below base of slightly glandular germen, free; anthers small introrse 2-rimose (sometimes effete). Germen free, 1-locular; style very short afterwards dilated in subsessile wide discoid unequally 4–5-lobed stigmatiferous head; ovule solitary descending, incompletely anatropous, more or less laterally inserted; micropyle extrorse superior. Fruit subbaccate oliviform; sarcocarp replete with oily glands; "seed with wide hilum laterally appended to cells; testa coriaceous; embryo exalbuminous; cotyledons oblong amygdaloid; radicle superior."—An evergreen glabrous tree; leaves alternate petiolate, 1-foliolate; foliole entire elliptical-lanceolate penninerved integerrimus coriaceous pellucid-punctuate; flowers[2] in axillary racemes; pedicels articulate at base, with small or sometimes foliaceous bracts; bractlets 2 lateral minute glanduliform[3] (*Mexico*[4]).

73. **Teclea** DEL.[5]—Flowers diœcious, 4, 5-merous. Calyx high gamosepalous campanulate, slightly dentate or crenate at apex, imbricated. Petals much longer, slightly imbricated. Stamens alternipetalous, 1-seriate (in female flower sterile shorter); filaments free; anthers oblong introrse, 2-rimose. Germen (in male flowers conical-subulate sterile), glandular thickened at base, 1-locular; style short, afterwards dilated in wide peltate obtusely lobed stigmatiferous head; ovules 2, parietally inserted in cells, collaterally descending; micropyle extrorse superior, blocked by shortly obconical obturator. Fruit drupaceous glandular-punctuate; putamen pergamentaceous, 1-spermous. Seed descending exalbuminous;

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[1] *Nov. Pl. Mex. Dec.* (in *Vidensk. Meddel.* (1853), 91).—B. H., *Gen.*, 303, n. 72.

[2] Small, whitish, or virescent.

[3] A genus doubtfully placed among the *Aurantieæ*, "potiusque forsan ad *Toddalieas* referendum" (B. H.), nevertheless corresponding in many respects with *Amyris*, and much more allied to *Tecleæ* than to the legitimate *Toddalias*.

[4] Spec. 1. *S. perforatus* LIEBM., *loc. cit.*—WALP., *Ann.*, iv. 428.

[5] In *Ann. Sc. Nat.*, sér. 2, xx. 90 (1843).—H. BN., in *Adansonia*, x. 320.—*Aspidostigma* HOCHST., in *Flora* (1844), 18.

embryo fleshy thick; cotyledons plano-convex glandular-punctuate; radicle short conical superior. A glabrous pellucid-punctuate tree; leaves alternate pedunculate, digitate, 3-foliolate or more rarely 1, 2-foliolate; folioles shortly petiolate, articulate at base, lanceolate penninerved; flowers in short axillary and terminal ramified and glomeruliferous racemes, at base glandular-thickened sessile (*Abyssinia*[1]).

VII. AURANTIEÆ.

74. **Limonia** L.—Flowers hermaphrodite, 3–5-merous; receptacle convex. Sepals free or more or less high connate, imbricated. Petals same in number alternate, longer imbricated. Stamens double in number to petals; filaments inserted below annular and stipiform disk, more or less dilated at base free; anthers introrse, sometimes bearing dorsal or apical glands, introrsely rimose. Germen seated on disk; cells 2, or oftener equal in number to petals, and opposite them; style rather short continuous with summit of germen, and often persistent (*Glycosmis*), or more rarely articulate at base, finally deciduous, more or less dilated stigmatiferous at apex; ovules in each cell 1, 2, descending; micropyle extrorse superior. Berry more or less pulpy, 1–5-locular, 1–5-spermous; seeds covered with mucilage; embryo exalbuminous fleshy thick; cotyledons plano-convex often punctulate; radicle short.—Odoriferous glandular-punctuate trees and shrubs, often spinose; leaves alternate, 1–3-foliolate, or more rarely imparipinnate, exstipulate; petiole sometimes winged; folioles opposite or alternate, entire or serrate; flowers axillary, or more rarely terminal in cymes (sometimes 1-flowered), or in more or less ramified cymiferous racemes (sometimes leafy) (*Trop. Australia, Africa, Asia*). See p. 405.

75. **Murraya** L.[2]—Flowers nearly of *Limonia;* calyx 5-fid or 5-partite. Stamens 8–10; filaments linear-subulate; anthers short. Germen 2–5-locular; ovules in each 1 (*Bergera*) or 2, collateral or

[1] Spec. 1. *T. nobilis* Del., *loc. cit.*—*Aspidostigma acuminatum* Hochst., *loc. cit.*—*Toddalia nobilis* Oliv., *Fl. Trop. Afr.*, i. 306.

[2] *Mantiss. Alt.*, 563.—J., *Gen.*, 261.—Lamk., *Ill.*, t. 352.—DC., *Prodr.*, i. 537.—Spach, *Suit. à Buffon*, ii. 254.—Endl., *Gen.*, n. 3506.—H. Bn., *Aurant.*, 12, 19, 33.—Oliv., in *Journ. Linn. Soc.*, v. Suppl., 15, 28.—B. H., *Gen.*, 304, 992, n. 76.—*Chalcas* L., *Mantiss.*, 68.—J., *Gen.*, 260.—*Bergera* Kœn., in *L. Mantiss.*, 563.—Endl., *Gen.*, n. 5505.—H. Bn., *Aurant.*, 12, 30.—*Sicklera* Rœm., *Synops.*, 49.

subsuperposed; style elongated, stigmatiferous capitate at apex, finally deciduous. Berry[1] ovoid or oblong; seeds 1, 2; testa glabrous or woolly.—Unarmed trees or shrubs; leaves pinnate; folioles alternate, unequal or cuneate at base, entire or crenulate; flowers[2] axillary, solitary or in axillary or terminal ramified cymiferous and corymbiform cymes (*Trop. Asia, Trop. and Subtrop. Australia*[3]).

76. **Micromelum** Bl.[4]—Flowers nearly of *Limonia*, 5-merous; calyx 3–5-lobed or subentire. Petals thick, valvate or subvalvate. Stamens 10, free. Germen 2–6-locular; ovules in cells 2, descending; style constricted articulate at base, deciduous. Berry dry; testa of seed membranous; embryo exalbuminous; cotyledons foliaceous, contortuplicate; radicle rather long. Other characters of *Limonia*.—Unarmed trees; leaves imparipinnate; folioles alternate, oblique, entire or serrulate; flowers in terminal dense cymiferous corymbiform clusters (*Trop. Oceania and Asia*[5]).

77. **Clausena** Burm.[6]—Flowers nearly of *Limonia* 4–5-merous; calyx lobed or partite. Stamens 8–10; filaments dilated at or below middle, often fornicate-concave, stipitate at apex; anthers short. Germen seated on stipiform disk, 2–5-locular; style finally deciduous; ovules in cells 2, collateral or superposed. Berry globose or oblong; seeds few, oblong; testa membranous; cotyledons equal, plano-convex.—Unarmed trees or shrubs; leaves imparipinnate, very often deciduous; folioles entire or crenulate, membranous; flowers in racemes, usually cymiferous, axillary or terminal (*Trop. Asia, Africa, and Australia*[7]).

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[1] Small.

[2] Usually rather large.

[3] Spec. ad 4. Roxb., *Pl. Coromand.*, t. 112 (*Bergera*).—Wight & Arn., *Prodr.*, i. 94.—Wight, *Icon.*, t. 13 (*Bergera*).—Thw., *Enum. Pl. Zeyl.*, 45, 46, 406.—Benth., *Fl. Austral.*, i. 368.—Lindl., in *Bot. Reg.*, t. 434.—Walp., *Ann.*, vii. 533.

[4] *Bijdr.*, i. 137.—Endl., *Gen.*, n. 5509.—H. Bn., *Aurant.*, 19, 35.—Oliv., *loc. cit.*, 18, 39.—B. H., *Gen.*, 303, n. 73.

[5] Spec. 3, 4. Wight & Arn., *Prodr.*, i. 90, not.—Miq. in *Ann. Mus. Lugd.-Bat.*, i. 211.—Turcz., in *Bull. Mosc.* (1858), i. 379; (1863), i. 578.—Thw., *Enum. Pl. Zeyl.*, 46.—Walp., *Ann.*, vii. 533.

[6] *Fl. Ind.*, 87.—J., *Gen.*, 430.—Lamk., *Ill.*, t. 310.—DC., *Prodr.*, i. 538.—Endl., *Gen.*, n. 5508.—H. Bn., *Aurant.*, 20, 33.—Oliv., *loc. cit.*; 17, 29.—B. H., *Gen.*, 304, n. 77.—*Cookia* Sonner., *Voy.*, ii. 130, t. 131.—Endl., *Gen.*, n. 5507.—*Quinaria* Lour., *Fl. Cochinch.*, 272.—*Aulacia* Lour., *op. cit.*, 273.—*Myaris* Presl., *Bot. Bem.*, 40.—*Fagarastrum* Don, *Syst.*, ii. 87.—A. Juss., in *Mém. Mus.*, xii. 506.—Endl., *Gen.*, n. 5940.—*Gallesioa* Rœm., *Synops.*, 45 (part.).—*Piptostylis* Dalz., in *Hook. Kew Journ.*, iii. 33, t. 2.

[7] Spec. 12, 13. Jacq., *Hort. Schœnbr.*, t. 101 (*Cookia*).—Wight, *Icon.*, t. 14.—Wight & Arn., *Prodr.*, i. 95.—Miq., *Fl. Ind. Bat.*, Suppl., i. 501.—Thw., *Enum. Pl. Zeyl.*, 47, 406.—Oliv., *Fl. Trop Afr.*, i. 307.—Harv. & Sond., *Fl. Cap.*, i. 444 *Myaris*).—Walp., *Ann.*, vii. 533, 534 (*Cookia*).

78. **Luvunga** Ham.[1]—Flowers nearly of *Limonia*, 4–5-merous; calyx cupuliform, subentire or 4–6-lobulate. Petals 4, 5, imbricated. Stamens 8–10; filaments subulate, free or connate below; anthers elongated. Germen surrounded at base by elevated annular or cupuliform disk, 2–4-locular; style finally deciduous. Berry[2] thick, corticate; seeds few; testa membranous, veined; embryo fleshy; cotyledons oblong, equal.—Scandent glabrous shrubs, often spinescent; leaves 3-foliolate; flowers in solitary or fasciculate simple or ramified cymiferous racemes (*Trop. Asia*[3]).

79. **Atalantia** Corr.[4]—Flowers nearly of *Limonia*, 3–5-merous Stamens 6–8, or more rarely 15–20, often irregularly adnate between themselves and with base of corolla 1-adelphous; anthers ovate or cordate. Germen surrounded at base by annular or cupuliform disk, 2–5-locular; ovules in cells 1, 2; style capitate, finally deciduous. Berry[5] corticate, subglobose, 1–5-locular, 1–5-spermous, or more rarely ∞-spermous.—Small trees or shrubs, spinose or unarmed; leaves 1-foliolate, persistent; flowers axillary, solitary or cymose, sometimes shortly racemose-cymose (*Trop. and East. Asia, Trop. Australia*[6]).

80. **Paramignya** Wight.[7]—Flowers nearly of *Limonia*, 4–5-merous; calyx cupular. Petals oblong, imbricated or induplicate-valvate. Stamens 8–10; anthers linear-oblong. Germen 3–5-locular, placed at summit of columnar thick stipiform receptacle; style deciduous; ovules in cells 1 (*Arthromiscus*[8]), or 2. Berry corticate, globose or ovoid, usually contracted at base.—Shrubs unarmed or armed with axillary spines, often scandent; leaves 1-folio-

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[1] In *Wall. Cat.*, n. 6382.—Endl., *Gen.*, n. 5511.—H. Bn., *Aurant.*, 20, 35.—Oliv., *loc. cit.*, 21, 43.—B. H., *Gen.*, 304, n., 78.—*Lavanga* Meissn., *Gen.*, 46, *Comm.*, 34.

[2] Elliptical, rather large.

[3] Spec. 3, 4. Wight & Arn., *Prodr.*, i. 90, not.—Thw., *Enum. Pl. Zeyl.*, 47.—Walp., *Ann.*, vii. 534.

[4] In *Ann. Mus.*, vi. 383.—DC., *Prodr.*, i. 535.—Endl., *Gen.*, n. 5499.—H. Bn., *Aurant.*, 29, 32.—Oliv., *loc. cit.*, 12, 23.—B. H., *Gen.*, 305, 992, n. 80.—*Sclerostylis* Bl., *Bijdr.*, 133 (part.).—*Lampetia* Rœm., *Synops.*, 42.—*Helia* Rœm., *loc. cit.*—? *Merope* Rœm., *loc. cit.*, 44.—*Rissoa* Arn., in *Nov. Act. Nat. Cur.*, xviii. 324.—*Severinia* Ten., *Ind. Sem. Hort. Neap.* (1840).—*Chilocalyx* Turcz., in *Bull. Mosc.* (1863), i. 588.

[5] Rather large.

[6] Roxb., *Pl. Coromand.*, t. 82 (*Limonia*).—Kœn., in *Act. Holm.* (1788), t. 10 (*Turræa*).—Wight, *Icon.*, t. 72 (*Sclerostylis*).—Hook., *Bot. Misc.*, Suppl., t. 3?.—Thw., *Enum. Pl. Zeyl.*, 44, 405.—Benth., *Fl. Austral.*, i. 370; *Fl. Hongk.*, 51.—Walp., *Ann.*, vii. 535.

[7] *Ill.*, i. 108, t. 42.—Endl., *Gen.*, n. 5510.—H. Bn., *Aurant.*, 19, 31.—Oliv., *loc. cit.*, 20, 41.—B. H., *Gen.*, 305, n. 79.

[8] Thw., *Enum. Pl. Zeyl.*, 47.

late,[1] entire, persistent; flowers[2] axillary, solitary or cymose (*Trop. India*[3]).

81. **Feronia** Corr.[4]—Flowers (nearly of *Limonia*) polygamous; calyx small, flat, 5, 6 dentate, deciduous. Petals 4–6. Stamens 10–12; filaments free, dilated at base; anthers oblong. Germen 4–6-locular; cells often incomplete; style short, thick, oblong, fusiform, stigmatiferous at apex, deciduous (?); ovules in cells ∞, descending. Berry subglobose;[5] cortex ligneous; cells ∞, incomplete, replete with pulp; seeds ∞, compressed; embryo fleshy; cotyledons thick.—A spinose tree; leaves imparipinnate; folioles opposite, subsessile, punctuate; petiole sometimes winged; flowers[6] in simple or ramified loose cymiferous racemes (*Trop. Asia*[7]).

82. **Ægle** Corr.[8]—Flowers nearly of *Feronia*, 4–5-merous; stamens ∞ (30–60), free; cells of ovary ∞, ∞-ovulate. Berry ∞-locular;[9] cortex ligneous; cells replete with mucus, ∞-spermous. Seeds "oblong, compressed; testa woolly, mucous."—Spinose trees; leaves 3-foliolate, punctuate; flowers[10] in scanty axillary racemes (*West. Trop. Africa and Asia*[11]).

83. **Citrus** L.—Flowers 5- or more rarely 4–8-merous; calyx cupular urceolate or more rarely subplane (*Papeda*). Stamens ∞, inserted round orbicular disk; filaments unequally polyadelphous, very rarely fasciculate, subfree (*Papeda*). Germen ∞-locular; style terete or obconical, often articulate at base, deciduous, stigmatiferous capitate subentire or lobed at apex; ovules in each cell ∞, 2-seriate inserted. Berry varying in form, corticate; cells ∞, interior filled with piliform compressed juicy cells (springing from endocarp). Seeds ∞, often few, horizontal or oblique, descending; testa more

[1] Articulation often obscure.

[2] White, rather large.

[3] Spec. ad 4. Wight, *Ill.*, t. 42 (*Micromelum*).—Walp., *Ann.*, vii. 534.

[4] In *Trans. Linn. Soc.*, v. 224.—DC., *Prodr.*, i. 538.—Spach, *Suit. à Buffon*, ii. 254.—Endl., *Gen.*, n. 5512.—H. Bn., *Aurant.*, 18, 35.—Oliv., *loc. cit.*, 21, 44.—B. H., *Gen.*, 305, n. 82.

[5] Large, externally corticate, hard.

[6] White, handsome.

[7] Spec. 1. *F. elephantum* Corr., *loc. cit.*—Roxb., *Pl. Coromand.*, ii. t. 141.—Wight & Arn., *Prodr.*, i. 96.

[8] In *Trans. Linn. Soc.*, v. 222.—DC., *Prodr.*, i. 538.—Spach, *Suit. à Buffon*, ii. 255.—Endl., *Gen.*, n. 5513.—H. Bn., *Aurant.*, 18, 36.—Oliv., *loc. cit.*, 21, 44.—B. H., *Gen.*, 306, n. 83.—*Belou* Adans., *Fam. des Pl.*, ii. 408.

[9] Large, often globose, exterior very hard, interior finally juicy.

[10] White, rather large, odoriferous.

[11] Spec. 2, 3. Wight, *Icon.*, t. 16.—Roxb., *Pl. Coromand.*, t. 143.—Wight & Arn., *Prodr.*, i. 96.

or less thick, coriaceous; embryo fleshy, 1–∞; cotyledons usually unequal, irregular, plano-convex or angular; radicle short, superior. —Trees or shrubs, often thorny, aromatic pellucid-punctulate; leaves alternate, persistent, usually 1-foliolate; petiole more or less dilated in wing; foliole coriaceous, entire or crenulate; flowers axillary, solitary or in simple or compound racemose cymes (*Trop. Asia*). See p. 407.

VIII. BALANITEÆ.

84. **Balanites** Del.—Flowers hermaphrodite; receptacle depressed. Sepals 5, obliquely imbricated at margin, deciduous. Petals 5, alternate, glabrous or villous, imbricated. Stamens 10, 2-seriate, inserted in inferior grooves of disk; filaments free, subulate; anthers introrse, 2-rimose. Germen free, surrounded at base by depressed conical 10-sulcate disk, excavated at apex; cells 5, oppositipetalous; style short, subulate, terete, or 5-sulcate, stigmatiferous, simple or minutely 5-lobed at apex; ovules solitary in cells, descending; micropyle extrorse, superior. Drupe oblong, fleshy, oily; putamen thick, hard, 5-agonal, 1-locular, 1-spermous; seeds descendent; embryo exalbuminous, thick; cotyledons oblong, plano-convex, sometimes corrugate or 2-lobed; radicle short, superior.—Spinose epunctuate shrubs; spines axillary, straight, strong; cortex bitter; leaves alternate, 2-foliolate; folioles coriaceous, entire; stipules very small, lateral; flowers in cymes axillary to leaves or bracts; pedicels articulate at base (*North-Eastern Africa, South-West. Asia*). See p. 410.

IX. QUASSIEÆ.

85. **Quassia** L.—Flowers hermaphrodite, regular, usually 5-merous; receptacle obconical or obpyramidal. Calyx partite or lobed, imbricated. Petals more or less thick, contorted or more rarely imbricated, finally at anthesis erect, connivent or oftener patent. Stamens double in number to petals, the oppositipetalous being shorter; filaments inserted with perianth, free, often enlarged at base in villous scales; anthers introrse, 2-rimose. Carpels equal in number to petals, and opposite them. Germens free, 1-locular, seated on summit of flat receptacle; styles coalescing in long

conical, more or less sulcate column, stigmatiferous, thickened or not so at apex; ovules in germens solitary, descending; micropyle extrorse, superior. Drupes 5 (or by abortion fewer), seated on common receptacle; endocarp more or less thick and hard; coats of solitary cell-like seed thin; embryo exalbuminous thick; cotyledons amygdaloid, plano-convex, equal or unequal; radicle superior, very short, retracted, usually cuboid.—Intensely bitter trees or shrubs; leaves alternate, imparipinnate, or more rarely 1–3-foliolate; folioles opposite, entire; rachis more or less articulate between juga; flowers in terminal and axillary racemes, simple or oftener ramified, often cymiferous; pedicels articulate, bracteolate (*Tropical America and Africa*). See p. 411.

86. **Simaruba** Aubl.[1]—Flowers diœcious, nearly of *Quassia* (or *Aruba*); calyx short, 5-dentate or 5-lobed, imbricated. Petals free, patent at apex, contorted. Stamens 10 (effete in female flower), inwardly appendiculate; receptacle dilated beyond insertion, depressed, subhemispherical. Carpels 5 (of *Quassia*), seated on summit of receptacle (sterile in male flower). Drupes 1–5, sessile, patent, and seed of *Quassia*.—Bitter trees; leaves alternate pinnate, folioles alternate entire; flowers[2] in axillary terminal simple or more or less ramified cymiferous racemes (*Tropical America*[3]).

87. **Hannoa** Pl.[4]—Flowers nearly of *Quassia* (or *Aruba*) polygamous-diœcious, 4-merous; male calyx at first closed, afterwards unequally 2, 3-parted, torn. Petals 5, contorted or imbricated, interior villous. Stamens 10 (sterile in female flower), inwardly enlarged in scales inserted below depressed-10-crenate dilatation of receptacle where 4–6 carpels of *Quassia* (sterile in male flower) are placed. Drupes 1–6, oblong, subreniform, small fleshy; seed and embryo of *Quassia*.—A small bitter tree; leaves alternate imparipinnate; folioles long petiolulate coriaceous glandular at apex; flowers[5]

[1] *Guian.*, ii., 856, t. 331, 332.—DC., in *Ann. Mus.*, xvii. 423; *Prodr.*, i. 733.—A. Juss., in *Mém. Mus.*, xii. 514, t. 27, fig. 44.—Spach, *Suit. à Buffon*, ii. 374.—Endl., *Gen.*, n. 5963.—B. H., *Gen.*, 309, n. 5.

[2] Small, ordinary.

[3] Spec. 3, 4. Lamk., *Ill.*, t. 343, fig. 2 (*Quassia*).—Gærtn., *Fruct.*, i. 340, t. 70, fig. 1 (*Quassia*).—H. B. K., *Nov. Gen. et Spec.*, vi. 16.—A. S. H., *Pl. Us. Bras.*, t. 5; *Fl. Bras. Mer.*, i. 70.—Griseb., *Fl. Brit. W.-Ind.*, 139.—Chapm., *Fl. S. Unit. St.* 67.—Seem., *Voy. Her., Bot.*, 95.—Tr., in *Ann. Sc. Nat.*, sér. 5, xv. 357.—Walp., *Ann.*, i. 163; vii. 537.

[4] In *Hook. Lond. Journ.*, v. 566.—B. H., *Gen.*, 308, n. 3.

[5] Small, white, odoriferous.

in terminal ramified compound cymiferous racemes (*Trop. West. Africa*[1]).

88. **Samandura** L.[2]—Flowers nearly of *Quassia*, 3–5-merous; calyx small, outwardly glandular at base, imbricated. Petals 3–5, much longer than calyx, contorted; receptacle dilated at base in small squamiform disk within petals, and produced higher in short cylindrical or obconical column-bearing ovary. Stamens inserted with perianth double in number to petals, 2-seriate; filaments free, furnished within at base with short scales; anthers introrse included. Gynæceum 3–5-merous (of *Quassia*), placed at summit of receptacle. Drupes 1–5, free, finally dry or suberose, widely compressed rigid carinate-winged, seed in each (nearly of *Quassia*). —Glabrous trees or small trees; leaves alternate petiolate simple oblong entire coriaceous, beneath slightly beyond base 2-glandular; flowers[3] few in long pedunculate false racemes (*Madagascar, Zeylania, Malaysian Arch.*[4]).

89. **Mannia** Hook. f.[5]—Flowers hermaphrodite (or polygamous?); sepals 5, imbricated. Petals same in number, alternate longer, obtuse, imbricated. Stamens 15–20, inserted outside below thick cupuliform disk, sinuate at margin; filaments short, free, or slightly connate at base, enlarged at base in short pilose scales; anthers longer, subglandular at apex, introrsely 2-rimose. Carpels 5, oppositipetalous; germens 5, free immersed in subcarinate disk, 1-locular; styles same in number coalescing in 5-agonal column, stigmatiferous 5-lobed at apex; ovules in cells solitary "ascending." Fruit. . .?—A remarkable glabrous tree; leaves alternate pinnate; petiole terete; folioles subopposite petiolulate linear-oblong entire retuse, oblique at base, thick coriaceous ribbed apiculate, glaucous beneath; flowers[6]

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[1] Spec. 1. *H. undulata* Pl., *loc. cit.*—Oliv., *Fl. Trop. Afr.*, i. 309.—Walp., *Ann.*, i. 163.—*Simaba*? *undulata* Guillem. & Perr., *Fl. Sen. Tent.*, i. 136, t. 34.

[2] *Fl. Zeyl.*, 202 (1747).—H. Bn., in *Adansonia*, x. fasc. 12.—*Samadera* Gærtn., *Fruct.*, ii. (1791) 352, t. 159.—A. Juss., in *Mém. Mus.*, xii. 516, t. 27, fig. 47.—Endl., *Gen.*, n. 5965.—B. H., *Gen.*, 310, n. 8.—*Locandi* Adans., *Fam. des Pl.*, ii. 449.—*Wiltmannia* Vahl., *Symb. Bot.*, iii. 51, t. 60.—*Niota* Lamk., *Ill.*, t. 299. —DC., *Prodr.*, i. 592.—*Biporeia* Dup.-Th., *Gen. Nov. Madag.*, 14.—DC., *loc. cit.*—*Manduytia* Commers., mss. (ex DC.).—*Manungala* Blanc., *Fl. Filip.*, 306.

[3] Rather large.

[4] Spec. 2, 3. Presl., *Symb.*, ii. t. 51.—Wight, *Ill.*, t. 68.—Wight & Arn., *Prodr.*, i. 151.—Hook., *Icon.*, t. 7.—Wall., *Pl. As. Rar.*, ii. t. 108 (*Niota*).—Pl., in *Hook. Lond. Journ.*, v. 563 (*Samadera*).—Walp., *Ann.*, i. 161; vii. 538 (*Samadera*).

[5] *Gen.*, 309, n. 4.

[6] Purple, handsome.

like floriferous branches axillary elongated, simple or slightly divided in short pedicellate cymes (*Trop. West. Africa*[1]).

90. **Hyptiandra** Hook. f.[2] — Flowers hermaphrodite, usually 5-merous; receptacle shortly conical. Sepals small free. Petals alternate, much longer, dorsally pilose, imbricated. Stamens 10, 5 oppositipetalous shorter; anthers introrse, 2-rimose versatile. Gynæceum placed on glandular thick depressed conical disk; germens free oppositipetalous villous; ovules in each 1, descending; micropyle extrorse superior; styles inserted at summit of germens, afterwards coalescing among themselves in short column, at apex only stigmatiferous free minutely capitellate. Fruit carpels 1 or more, seated on acute obpyramidal receptacle compressed ovate, subdrupaceous; exocarp subcoriaceous, putamen 1-spermous; seed ventrifixed; testa membranous; albumen very scanty; embryo straight; cotyledons ovate plano-convex; radicle short superior. — Shrub somewhat glabrous, younger branches pubescent; leaves alternate (bitter[3]) narrow lanceolate entire coriaceous; flowers small, shortly pedunculate, axillary, solitary or few (*East. Subtrop. Australia*[4]).

91. **Castela** Turp.[5] — Flowers diœcious, 4-merous; receptacle short. Calyx small, 4-fid. Petals 4, longer, imbricated. Stamens 8, 2-seriate; filaments free inserted below 8-crenate disk; scales 0, or very short; anthers (sterile in female flower or 0) 2-locular, at margin or extrorsely rimose. Carpels 4, oppositipetalous (rudimentary or 0 in male flower), seated on disk; germens free; styles coalescing at middle, at apex inwardly stigmatiferous revolute; ovules in germens solitary descending incompletely anatropous; micropyle extrorse superior. Drupes 4 (or fewer from abortion), free patent; mesocarp usually thin; putamen crustaceous; seeds descending, with wide funicle; testa membranous; albumen thin; embryo inverse; cotyledons plano-convex; radicle superior. — Shrubs; branches often spinescent; leaves alternate small very shortly petiolate entire

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[1] Spec. 1. *M. africana* Hook. f., *loc. cit.* — Oliv., *Fl. Trop. Afr.*, i. 313.

[2] *Gen.*, 293, n. 37 (*Rutacea*); 992, n. 8 *a* (*Simarubea*). — F. Muell., *Fragm.*, vi. 165.

[3] Bark and wood.

[4] Spec. 1. *H. Bidwilli* Hook. f., *loc. cit.* — Benth., *Fl. Austral.*, i. 374. — Walp., *Ann.*, vii. 523.

[5] In *Ann. Mus.*, vii. 78, t. 5; in *Dict. Sc. Nat.*, Atl., t. 126. — DC., *Prodr.*, i. 738. — Spach, *Suit. à Buffon*, ii. 380. — Endl., *Gen.*, n. 5956. — A. Gray, *Gen. Ill.*, t. 158. — B. H., *Gen.*, 310, n. 9.

coriaceous, articulate at base; flowers[1] axillary cymose, usually few (*Trop. and Subtrop. America*[2]).

92? **Holacantha** A. Gray.[3]—"Flowers by abortion dicœcious; male receptacle subcupuliform. Calyx short, 5–8-partite, imbricated. Petals 5–8 oblong, imbricated, deciduous. Stamens 10–16, inserted without below crenate disk; filaments rather thick villous (subulate in female flower); anthers introrse ovate 2-rimose (effete in female flower). Germen (in male flower rudimentary depressed conical) placed on disk. Carpels 5–8 free; germens 1-locular tapering in terminal styles subcoalescing at base, afterwards subulate and inwardly stigmatiferous divergent; ovule in each germen solitary inserted on internal wall incompletely anatropous; micropyle extrorse superior. Drupes (?) 4–6, patent separating from short-rigid 4–6-fid receptacle; exocarp thin; putamen crustaceous; seeds ovate; testa thin; albumen fleshy scanty; embryo straight, radicle short superior; cotyledons flat ovate.—An aphyllous orgyalis shrub; branches ascending; twigs changing into strong spines, flowers small glomerate on spinescent branches"[4] (*N. Mexico*[5]).

93. **Ailantus** Desf.[6]—Flowers polygamous; calyx short, 5-fid, imbricated. Petals 5, longer, induplicate valvate, patent;[7] receptacle dilated beyond perianth in 10-lobed disk (in male flower depressed, in female large elevated subhemispherical). Stamens 10, 2-seriate, inserted at base of disk (in female flower all or partly sterile, sometimes 5–7, or all wanting); filaments free; anthers 2-locular; cells at margin or subextrorsely rimose.[8] Carpels 2–5, oppositipetalous (rudimentary or 0 in male flower) seated at summit of disk;[9] germens

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[1] Small, red, or virescent.

[2] Spec. 5, 6. Hook., *Bot. Misc.*, i. 271, t. 56.—Griseb., *Fl. Brit. W.-Ind.*, 140.—Liebm., in *Vidensk. Medd.* (1853), 108 (part.).—Te., in *Ann. Sc. Nat.*, sér. 5, xv. 359.—Walp., *Ann.*, i. 164; vii. 539.

[3] *Pl. Thurber.*, in *Mem. Amer. Acad.*, sér. nov., v. 310.—B. H., *Gen.*, 310, n. 10.

[4] A doubtful genus almost unknown to us, enumerated after *Castela* among the *Simarubaceæ*. (B. H.), with aspect of *Kœberlinia*, from description of figure allied to *Astrophyllum*, with aphyllous branches and apparently eglandular.

[5] Spec. 1. *H. Emoryi* A. Gray, *loc. cit.*—Torr., in *Emor. Rep., Bot.*, t. 8.—Walp., *Ann.*, vi. 419.

[6] In *Act. Ac. Par.* (1786), 263, t. 8.—DC., *Prodr.*, ii. 88.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 358.—A. Juss., in *Mém. Mus.*, xii. 511.—Spach, *Suit. à Buffon*, ii. 370.—Endl., *Gen.*, n. 5980.—Payer, *Organog.*, 110, t. 24.—B. H., *Gen.*, 309, 992, n. 6.

[7] In *A. glandulosa* Desf. the petals are induplicate, valvate, slightly imbricated at apex, at base within concave and pilose.

[8] *A. glandulosa*, inserted at apex of filament outwardly at middle of connective.

[9] A disk correctly said to be double; exterior outwardly 10-lobed, prominent between petals and stamens; inferior lobes alternating with exterior, surrounding base of carpels in female flowers.

free, 1-locular; styles same in number inserted at summit of internal angle of germen, approximate or more or less cohering and twisted among themselves; apex stigmatiferous variously dilated or recurved free; ovules in germens solitary descending incompletely anatropous; micropyle extrorse superior.[1] Samaras 1–5 free linear-oblong membranous veined, at middle seminiferous and sometimes subdrupaceous, sometimes apiculate with lateral style; seeds compressed scantily albuminous; embryo subequal to albumen; cotyledons flat foliaceous elliptical; radicle short superior.—Lofty trees;[2] leaves alternate imparipinnate; folioles alternate entire, sometimes oblique or sinuate-dentate; flowers[3] in much ramified terminal cymiferous bracteolate racemes (*South-East. Asia, Trop. and Subtrop. Australia*[4]).

94. **Picræna** Lindl.[5]—Flowers polygamous, 4–5-merous; sepals short free or connate at base. Petals longer, subvalvate or slightly imbricated. Stamens equal in number to petals and alternating with them, inserted below disk, thick depressed between stamens; filaments free esquamate; anthers (effete or 0 in female flowers) introrse, 2-rimose. Carpels 3, 4, seated on summit of disk oppositipetalous; germens (rudimentary or 0 in male flower) free (of *Quassia*); styles free at base and apex, at middle more or less cohering, at apex recurved or reflexed stigmatiferous. Drupes 1–3, and exalbuminous seeds of *Quassia*.—Bitter trees; leaves alternate imparipinnate; folioles opposite entire or crenate; flowers[6] in axillary and terminal ramified cymiferous racemes (*Trop. America*[7]).

95. **Picrasma** Bl.[8]—Flowers nearly of *Picræna;* petals 4, 5, in male flower usually marcescent, in female accrescent after anthesis, valvate. Stamens equal in number to petals (in female flower effete or 0). Carpels (in male flower sterile) 3–5; styles inserted at

[1] Coats double.

[2] Subfetid; bark sometimes bitter.

[3] Small, virescent or whitish.

[4] Spec. ad 4, of which 1 is everywhere common (scil. *A. glandulosa*). Lhér., *Stirp.*, t. 84.—Roxb., *Pl. Coromand.*, t. 23.—Wight & Arn., *Prodr.*, i. 150.—Wight, *Icon.*, t. 1604.—F. Muell., *Fragm.*, iii. 42 (part.).—Benth., *Fl. Austral.*, i. 373.—Walp., *Rep.*, v. 165; *Ann.* vii. 538.

[5] *Bot. Med.*, 208.—B. H., *Gen.*, 311, n. 14.—H. Bn., in *Adansonia*, xi. fasc. 1.—*Muenteria* Walp., *Rep.*, v. 398.—*Æschryon* Velloz., *Fl. Flum.*, i. t. 152.—*Picranena* Lindl. (ex Pl., in *Hook. Lond. Journ.*, v. 572).

[6] Small, virescent.

[7] Spec. 3. Pl., in *Hook. Lond. Journ.*, v. 573 (*Picrasma*).—Griseb., *Fl. Brit. W.-Ind.*, 140.—Walp., *Ann.*, i. 167 (*Picrasma*).

[8] *Bijdr.*, 247.—Endl., *Gen.*, n. 5972, g. (*Zanthoxylon*).—B. H., *Gen.*, 311, n. 12.

angular base of germen recurved, subfree or cohering at middle among themselves; ovules solitary, finally ascending. Drupes 1–5, scarcely fleshy; putamen crustaceous or coriaceous; seeds formed like cell, copiously filled with albumen; embryo straight.—Bitter trees; leaves alternate imparipinnate; folioles entire or glandular-dentate; the inferior sometimes stipuliform; flowers[1] in axillary ramified cymiferous racemes[2] (*Trop. and East. Asia*[3]).

96. **Picrolemma** Hook. f.[4]—Flowers dicœcious; male usually 4-merous; calyx cupular, imbricated, and petals longer, alternate, imbricated, punctuate, deciduous. Stamens 4, oppositipetalous, inserted round minute rudimentary gynæceum; glands 4, small alternate; filaments free, more or less corrugated in bud; anthers 2-rimose. Female flowers usually 5-merous; stamens 5, sterile rudimentary, inserted below base of 5 carpels; germens free; ovules in each solitary, descending; style short, thick, capitate, stigmatiferous at apex. Drupes[5] (solitary by abortion); flesh scanty; putamen thin, crustaceous; linear hilum of seeds and embryo of *Quassia*.—Small simple glabrous trees; bark very bitter; leaves alternate imparipinnate; folioles multijugate, petiolulate, entire; flowers[6] in slender irregularly ramified cymiferous racemes shorter than leaf (*Trop. South-East. America*[7]).

97. **Brucea** Mill.[8]—Flowers polygamous (nearly of *Picræna*), 4-merous, sepals short, imbricated. Petals longer, imbricated. Stamens 4, alternipetalous (effete in female flower), inserted externally below disk between the 4 lobes; filaments free, naked; anthers introrse, 2-rimose. Carpels 4, oppositipetalous (rudimentary or 0 in male flower); germens free; styles free, usually thick, recurved, inwardly at middle only cohering among themselves, otherwise free, inwardly stigmatiferous patent at apex; ovule in germens solitary,

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[1] Virescent.

[2] A genus nearly allied to *Picræna* (formerly a section of it) differing by accrescent petals, ovules, and albumen.

[3] Spec. 5, 6. Benn., *Pl. Jav. Rar.*, t. 41.—Miq., *Fl. Ind.-Bat.*, i. p. ii. 679, t. 28.—A. Gray, in *Mem. Amer. Acad.* (1859), 383, not.—Walp., *Ann.*, iv. 167 (spec. as.); vii. 540.

[4] *Gen.*, 312, n. 15.

[5] Rather large glabrous, "minute."

[6] Small, golden, ebracteate.

[7] Spec. 1. *P. Sprucei* Hook. f., *loc. cit.*

[8] *Fasc.*, t. 25.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 362.—DC., *Prodr.*, ii. 88.—Juss., in *Mém. Mus.*, xii. 501.—Spach, *Suit. à Buffon*, ii. 362.—Endl., *Gen.*, n. 5970.—B. H., *Gen.*, 311, n. 13.—H. Bn., in *Dict. Encycl. Sc. Méd.*, xi. 174; in *Adansonia*, xi. fasc. 1.—*Gonus* Lour., *Fl. Cochinch.*, 809.—*Nima* Ham., mss. (ex A. Juss., *loc. cit.*, 516).—Endl., *Gen.*, n. 5966.

descending; micropyle extrorse, superior. Drupes 1–4, seed and embryo (exalbuminous) of *Quassia* (or *Picræna*). — Bitter trees; leaves alternate imparipinnate; folioles entire or largely serrate; flowers[1] in axillary elongated cymiferous spikes; pedicels bracteolate, articulate (*Tropical and Subtropical Asia and Africa*[2]).

98? **Kirkia** Oliv.[3]—"Flowers polygamous; calyx wide at base, 4-partite; segments ovate. Petals 4, oblong-lanceolate, much longer than calyx, finally patent; margin involute. Stamens 4, alternipetalous, inserted round fleshy 4-agonal disk; filaments filiform, exappendiculate, glabrous; anthers ovate-oblong muticous, 2-locular, longitudinally rimose, dorsifixed slightly above base. Germen (minute) deeply 4-lobed, 4-locular, glabrous; styles distinct, very short; stigmas simple. Ovule solitary or (very occasionally 2?) inserted at internal angle very minute. Fruit dry, oblong 4-quetrous, finally separating into 4 cocci, linear-oblong, glabrous, 1-spermous, indehiscent, inciso-dentate above, entire or emarginate at base, pendulous from central carpophorum; epicarp thin; endocarp coriaceous and subosseous, finally fibrous. Seeds exalbuminous; testa papyraceous; cotyledons fleshy, linear-oblong, complanate, emarginate at base, much longer than thick subacute superior radicle.—A glabrous tree; leaves usually fasciculate at summit of branches, alternate multifoliolate exstipulate; folioles subopposite or alternate oblique lanceolate acuminate serrulate; flowers in cymose crowded pedunculate corymbs axillary to upper leaves, constituting a wide leafy panicle; pedicels equal to or shorter than flowers"[4] (*Region of the Zambesi*[5]).

99. **Eurycoma** Jack.[6]—Flowers polygamous; sepals 5, small, free or connate at base, usually bearing glandular hairs. Petals 5, much longer; margin induplicate-valvate. Stamens 5, alternipetalous (effete in female flower); filaments free, externally bearing 10 glands alternating in pairs with stamens, stipate; anthers short, often

[1] Small, insignificant, virescent, often outwardly pilose.

[2] Spec. 5, 6. Roxb., *Fl. Ind.*, i. 469.—Guerr., in *Bull. Soc. Philom.*, iii. 182.—Dcne., in *Nouv. Ann. Mus.*, ii. t. 20.—Oliv., *Fl. Trop. Afr.*, i. 309.—Miq., *Fl. Ind.-Bat.*, Suppl., 209, 535.—Walp., *Ann.*, i. 167.

[3] *Fl. Trop. Afr.*, i. 310.

[4] Char. all taken from Oliv.

[5] Species unknown to us. *K. acuminata* Oliv., *loc. cit.* — Hook., *Icon.*, t. 1036 (ex Oliv.).

[6] Ex Roxb., *Fl. Ind.*, ii. 307.—DC., *Prodr.*, ii. 86.—Endl., *Gen.*, n. 5952.—B. H., *Gen.*, 312, n. 16.

reflexed, versatile laterally or subintrorsely rimose. Carpels 5, oppositipetalous (in male flower rudimentary or 0); germens free; styles same in number, soon coalescing among themselves, stigmatiferous free at apex; ovule solitary in germens, descending; micropyle extrorse superior. Drupes 3–5, stipitate or subsessile, dry, finally late inwardly dehiscing; seed and exalbuminous embryo of *Quassia*.—Bitter trees; branches frondose at apex; leaves alternate imparipinnate; folioles oblong, entire, ∞-jugate; flowers in large subterminal much ramified cymiferous racemes; branches and twigs glandular-pilose compressed (*Malayan Archipelago*[1]).

100. **Picrella** H. Bn.[2]—Flowers hermaphrodite; receptacle shortly convex. Sepals 4, decussate-imbricated. Petals 4, alternate, much longer, erect-connivent in suburceolate corolla, valvate, acute, finally reflexed at apex. Stamens 4, alternipetalous; filaments free, inserted without between lobes of hypogynous glandular[3] disk; anthers short, introrse, 2-rimose. Carpels 4, oppositipetalous; germens free, produced at apex in short slender styles, soon coalescing among themselves; summit of column stigmatiferous subovoid-capitate; ovules solitary in each cell, inserted at internal angle; either descending micropyle extrorse, superior; or ascending micropyle introrse, inferior. Fruit . . . ?—A glabrous shrub, in all parts glandular-punctuate and very bitter; leaves opposite petiolate, 3-foliolate; folioles ovate or subobovate; flowers[4] in small opposite cymuliferous racemes, axillary to leaves of upper branches; pedicels articulate, 3-bracteolate[5] (*Mexico*[6]).

101. **Dictyoloma** DC.[7]—Flowers polygamous, 5-merous; calyx gamophyllous, short, imbricated? Petals 5, much longer than calyx, imbricated. Stamens 5, alternipetalous; filaments free, inwardly crowded with wide simple or 2-fid ciliate glands; anthers introrse, 2-rimose, versatile. Carpels 5, oppositipetalous (rudimentary in male flower), seated on summit of receptacle, produced beyond stamens in glandular knobs longitudinally before staminal

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[1] Spec. 2. Miq., *Fl. Ind.-Bat.*, Suppl., 209, 335.—Walp., *Ann.*, i. 174.

[2] In *Adansonia*, x. 149, t. 10.

[3] "Discus inter stamina prominulus ibi lobos totidem truncatos efformare videtur." (H. Bn., *loc. cit.*)

[4] Small, white.

[5] A genus as if intermediate between *Esenbeckia* (*Zanthoxylon*) and *Simarubeæ*.

[6] Spec. 1. *P. trifoliata* H. Bn., *loc. cit.*

[7] *Prodr.*, ii. 89.—A. Juss., in *Mém. Mus.*, xii. 499, t. 24.—B. H., *Gen.*, 312, n. 17.

filaments 5-sulcate; germens free, 2–5-ovulate; ovules curved, inserted at internal angle, 2-seriate; funicle ascending or descending; styles coalescing among themselves, free, thick, reflexed, stigmatiferous at apex. Capsules 5 (or fewer), free, compressed, 2-valved; endocarp chartaceous, separating from thin exocarp; seeds in each solitary or few, compressed, suborbicular, furnished with very thin suborbicular radiate striate concentric and veined marginal wing; embryo scantily albuminous, curved; radicle terete, superior.—Small trees (not bitter) cinereo-pubescent; leaves alternate, 2-pinnate; folioles multijugate, glandular-punctuate; flowers[1] in large wide ramified compound cymiferous racemes, winged above (*Brazil*[2]).

102. **Cneoridium** Hook. f.[3]—Flowers hermaphrodite, 4-merous; sepals short, imbricated. Petals much longer than calyx, imbricated. Stamens 8, inserted with perianth, 2-seriate; filaments free; oppositipetalous 4 shorter, sometimes wanting; anthers suborbiculate, introrsely 2-rimose. Gynæceum inserted at summit of receptacle, produced beyond insertion of perianth and stamens in short thick 8-agonal column; germen of solitary subexcentric carpel 1-locular; style gynobasic, inserted slightly above the base of germen, stigmatiferous at apex; ovules 2, collaterally inserted slightly above base of cell, ascending; raphe dorsal. Drupe globose, pisiform, coriaceous; seed 1, ascendant; testa subcrustaceous; embryo exalbuminous; cotyledons thick, plano-convex.—A glabrous shrub; sap bitter, subacrid; leaves opposite or subverticillate, simple, linear, entire, coriaceous, subfleshy, glandular-punctulate, glandular at margin, exstipulate; flowers axillary, usually solitary; peduncle 2-bracteolate[4] (*California*[5]).

103. **Cadellia** F. Muell.[6]—Flowers 5-merous (more rarely 6, 7-merous); sepals imbricated. Petals larger alternate, imbricated. Stamens 10, 2-seriate, hypogynous; filaments free, subulate; anthers introrse, 2-rimose. Carpels 1 or 5, free, oppositipetalous,

[1] Outwardly sericeous, bitter.
[2] Spec. 2. Walp., *Ann.*, i. 174.
[3] *Gen.*, 312, n. 18. — *Pitaviæ* sect. *Gastrostyla* Torr., in *Emor. Rep., Bot.*, 43.
[4] "Gen. *Surianæ* proxim., *Cneoro* quoque affine." (Hook. f., *loc. cit.*)
[5] Spec. 1. *C. dumosum* Hook. f., *loc. cit.*—*Pitavia dumosa* Nutt., mss. (ex Torr. & Gr., *Fl. N.-Amer.*, 215).
[6] *Fragm. Phyt. Austral.*, ii. 25, t. 12.—B. H., *Gen.*, 313, 992, n. 19.

subsessile; germens 1-locular; styles same in number, inserted at internal angle of germen at or slightly above base, free, capitellate stigmatiferous at apex; ovules in each cell 2–5, collaterally descending,[1] incompletely anatropous; micropyle extrorse, superior. Drupes 1–5, free, slightly fleshy; putamen hard; embryo exalbuminous, fleshy; cotyledons convolute-plicate; radicle short, superior.—Trees (not bitter); branches slender; leaves alternate, simple, petiolate; stipules minute, caducous; flowers in few-flowered axillary racemes (?); pedicels slender, 2-bracteolate at base[2] (*Subtrop. Australia*[3]).

104. **Tariri** Aubl.[4]—Flowers dicœcious, 3–5-merous; petals longer than calyx, imbricated or subvalvate, more rarely 0. Stamens equal in number to petals and opposite them (sterile in female flower). Glands alternipetalous, equal in number to stamens, free or connate. Gynæceum seated on summit of disk, 2, 3-merous; germen single, 2–3-locular; style erect, more or less long 2, 3-fid at apex; lobes recurved, inwardly stigmatiferous; ovules in cells 2, collaterally descending; micropyle extrorse, superior, usually blocked with thick obturator. Berry oliviform 1, 2-locular; cells 1-spermous; seeds descending; testa thin; embryo exalbuminous; cotyledons (?) undivided, adhering to coats; position of radicle . . . ?—Trees or shrubs usually intensely bitter; leaves alternate imparipinnate; folioles entire; flowers[5] in spikes or racemes, usually elongated pendulous cymiferous, terminal or leaf-opposed[6] (*Trop. America*[7]).

105? **Spathelia** L.[8]—Flowers polygamous; receptacle convex. Sepals 5, usually coloured, imbricated or subovate. Petals 5, alter-

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[1] Sub 2-seriatis.

[2] A genus nearly related by its flowers to *Picrasma* and *Suriana*. By 1-carpellary species, strongly pointing to *Cneoridium*, only distinguished from it by ovules and seeds. Somewhat related to *Hyptiandra* by more polygamous species.

[3] Spec. 2. F. Muell., *loc. cit.* — Benth., *Fl. Austral.*, i. 374.—Walp., *Ann.*, vii. 540.

[4] *Guian.*, Suppl., 37, t. 390 (1775).—Tr., in *Ann. Sc. Nat.*, sér. 5, xv. 353.—*Picramnia* Sw., *Prodr.*, (1783), 27; *Fl. Ind. Occ.*, i. (1797), 217, t. 4.—Schreb., *Gen.*, n. 1517.—J., *Gen.*, 370.—Endl., *Gen.*, n. 5941. — B. H., *Gen.*, 315, n. 28.—H. Bn., in *Adansonia*, xi. fasc. 1.

[5] Small, somewhat purple or virescent.

[6] A genus nearly related to *Spathelia*, *Burseraceæ*, *Chailletia*, and 2-ovulate *Euphorbiaceæ*.

[7] Spec. ad 20. Tul., in *Ann. Sc. Nat.*, sér. 3, vii. 257.—Benth., *Sulph. Voy., Bot.*, 166 (*Cicca*).—Srem., *Voy. Her., Bot.*, 95, t. 24 (*Picramnia*).—Pl., in *Hook. Lond. Journ.*, v. 578. — Griseb., *Fl. Brit. W.-Ind.*, 14 (*Picramnia*).—Tr., *loc. cit.*, 354 (*Picramnia*). — Walp., *Ann.*, i. 168; iv. 429; vii. 542 (*Picramnia*).

[8] *Gen.*, n. 373. — J., *Gen.*, 371. — Poir., *Dict.*, vii. 309.—Lamk., *Ill.*, t. 200.—Gærtn., *Fruct.*, i. 278, t. 58.—K., in *Ann. Sc. Nat.*, sér. 1, ii. 357.—DC., *Prodr.*, ii. 84.—Endl., *Gen.*, n. 5979.—B. H., *Gen.*, 315.—*Spathe* P. Br., *Jam.*, 187.

nate longer, glandular at apex, imbricated. Stamens 5, alternipetalous (in female flower sterile); filaments inserted outwardly below hypogynous 5-agonal disk, subpetaloid at base, ciliate or villous, interior naked or with 2 lateral scales, more or less high, stipate; anthers introrse, 2-rimose. Germen very shortly stipitate beyond disk (in male flower rudimentary), 3-agonal, 3-locular; styles short, 3-lobed, inwardly stigmatiferous, sometimes reflexed at apex; ovules in each cell solitary or 2-nate, inserted below apex at internal angle, descending; micropyle introrse, superior; raphe dorsal. Fruit samaroid, with linear-oblong nucleus, subdrupaceous, 3-winged; wings vertical, finally dry; putamen hard, 3-agonal, attenuated on both sides, traversed by resiniferous channels; cells 3, 1-spermous (or abortive 1, 2). Seeds somewhat terete; testa fibrous; albumen fleshy; embryo straight; radicle very short, superior; cotyledons linear-oblong.—Trees;[1] trunk simple; leaves alternate, imparipinnate; folioles multijugate, alternate, linear-oblong or falciform, entire or serrate, glanduliferous at margin; flowers[2] in large terminal elongated cymiferous racemes; bractlets very small[3] (*Western India*[4]).

106? **Picrodendron** Pl.[5]—Flowers "dicœcious;" male . . .? Female flowers 5-merous; sepals small and petals (?) same in number, alternate, laterally glandular.[6] Germen free, 2-locular; style branches 2, linear, at apex stigmatiferous revolute; ovules in cells 2, collaterally descending; micropyle extrorse, superior, blocked by rather thick obturator. Drupe 1-spermous (one cell effete); "putamen finally sub-2-valved; seeds sulcate, exalbuminous; testa membranous, insinuated between folds of embryo; cotyledons plicate; radicle superior."—A small very bitter tree; leaves alternate, 3-foliolate; folioles entire; flowers "male amentaceous axillary;"[7] female axillary, solitary, pedunculate[8] (*Cuba*[9]).

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[1] Lofty, not bitter.

[2] Rather large; somewhat purple when dry.

[3] A genus very anomalous among the *Rutaceas*, nearly allied to *Boswellia*, and perhaps better placed among the *Burseræ*. Apotropous ovule rarely observed in this order.

[4] Spec. 3, 4. Ker, in *Bot. Reg.*, t. 670.—Griseb., *Fl. Brit. W.-Ind.*, 140; *Cat. Pl. Cub.*, 49.—Walp., *Ann.*, i. 173.

[5] In *Hook. Lond. Journ.*, v. 579.—B. H., *Gen.*, 315, n. 29.

[6] Known only from induviate fruit, thus requiring further examination.

[7] Ex Sloane, *Jam.*, t. 157, fig. 1 (*Juglans*).

[8] A genus to be studied.

[9] Spec. 1. *P. Juglans* Griseb., *Fl. Brit. W.-Ind.*, 177. — *P. trifoliatum* Pl., mss. — *Juglans baccata* L. — *Schmidelia macrocarpa* A. Rich., *Fl. Cub.*, i. 283, t. 30.

107. **Harrisonia** R. Br.[1]—Flowers hermaphrodite ; calyx short, 4, 5-fid. Petals 4, 5, longer, rather thick, valvate. Stamens 8–10, inserted round annular or shortly cupular (*Lasiolepis*[2]) disk ; filaments free, enlarged at base in scales, entire or shortly 2-fid ; the oppositipetalous slightly shorter ; anthers introrse, 2-rimose. Germen free ; cells 4, 5, oppositipetalous, more or less prominent at back ; styles same in number, connate or free at base, stigmatiferous slightly dilated at apex ; ovule in cells solitary, descending ; micropyle extrorse, superior. Drupe globose or depressed, with 2–5-pyrena ; pyrena perforated, 1-spermous ; seeds curved ; testa rather thick ; embryo scantily albuminous ;[3] cotyledons conduplicate at middle ; radicle short, superior.—Glabrous[4] spinescent shrubs ; spines often 2-nate ; leaves alternate, 1–3-foliolate or imparipinnate ; folioles entire or few-dentate ; flowers in axillary cymes ; pedicels bracteolate at base (*Australia, Malay. Arch.*[5]).

108? **Irvingia** Hook. f.[6]—Flowers hermaphrodite, 4–5-merous ; sepals short, free, connate at base, imbricated. Petals longer, imbricated, patent. Stamens 8–10, 2-seriate ; filaments inserted below thick elevated pulviform disk, free ; more or less plicate in bud ; the oppositipetalous shorter ; anthers short, introrse, 2-rimose. Germen seated at summit of depressed disk, 2-locular ; style simple, curved in bud, stigmatiferous more or less capitellate at apex ; ovule in each cell solitary, descending, incompletely anatropous ; micropyle extrorse, superior. Drupe thick, ligneous, oblong or shortly ovate, compressed ; flesh scanty ; putamen hard ; albumen fleshy, copious[7] or 0 ;[8] embryo inverse ; cotyledons[9] flat, foliaceous or plano-convex, amygdaloid ; radicle short, superior.—Glabrous insipid epunctuate trees ; branches annulate at nodes ; bud blocked by axillary stipules, convolute in acuminate more or less curved cone (finally marked with the annular cicatrix) ; leaves alternate, simple, entire, coria-

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[1] Ex A. Juss., in *Mém. Mus.*, 517, xii. t. 28, fig. 47 (nec Adans., nec Hook.).—Endl., *Gen.*, n. 5967.—B. H., *Gen.*, 314, n. 25.—*Ebelingia* Reichb., *Consp.*, 199.

[2] Benn., *Pl. Jav. Rar.*, 202, t. 42.—Pl., in *Hook. Lond. Journ.*, v. 570.

[3] Greenish.

[4] Dry nigrescent.

[5] Spec. 2, 3. Gaudich., in *Freycin. Voy., Bot.*, t. 103.—Miq., *Fl. Ind.-Bat.*, Suppl., 209. —Benth., *Fl. Austral.*, i. 376.—Walp., *Ann.*, i. 165.

[6] In *Trans. Linn. Soc.*, xxiii. 167.—B. H., *Gen.*, 314, 993, n. 24.—H. Bn., in *Adansonia*, viii. 91.

[7] In *I. Smithii* Hook. f., the cotyledons of which are foliaceous.

[8] In *I. Gabonensi* (H. Bn., *loc. cit.*—*I. Barteri* Hook. f.), with plano-convex cotyledons.

[9] In *I. Smithii* virescent.

ceous, petiolate; flowers[1] in terminal and axillary compound-ramified racemes[2] (*Trop. West. Africa*[3]).

109. **Soulamea** Lamk.[4]—Flowers polygamous, 3-merous, more rarely 4–5-merous; receptacle short. Sepals free or connate at base, valvate or imbricated. Petals same in number, alternate longer, usually linear-patent, imbricated or subvalvate. Stamens double in number to petals, 2-seriate (in female flower sterile or 0); filaments free, naked; anthers short extrorse, 2-rimose. Glands opposite petals, equal in number to them, thick subtruncate, sometimes unequally lobed. Germen (in male flower rudimentary or oftener 0) free, compressed, 2-locular; styles 2, short distant, capitate, recurved, stigmatiferous at apex; ovules solitary in cells, descending, incompletely anatropous; micropyle extrorse, superior. Fruit indehiscent, obcordate, dry, coriaceous, marginally winged; wings short, thick or wide, submembranous, veined; endocarp ligneous, 2-locular. Seeds solitary in cells, affixed at middle or descendent; testa membranous; albumen thin; embryo inverse; cotyledons elliptical or oblique oblong; radicle short, superior.—Bitter glabrous or villous trees and shrubs; leaves alternate, long petiolate, simple 3-foliolate or imparipinnate; flowers[5] in spikes or racemes, simple, axillary, cymiferous (*Warm Subtrop. Oceania*[6]).

110? **Amaroria** A. Gray.[7]—Flowers 1-sexual, male nearly of *Soulamea*, "3-merous, 3-androus; stamens alternipetalous; anthers subsessile; 3 lobes of fleshy disk 2-fid." Female flowers 4, 5-merous; sepals short, persistent, and petals same in number, alternate narrow patent. Staminodes (?) 5–10, inserted below thick crenate disk. Germen excentric, unequally-ovid, 1-locular; ovule 1, descending, incompletely anatropous; micropyle extrorse, superior; style short,

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[1] Small, odoriferous, whitish or yellow.

[2] A genus scarcely of this series, hence agreeing with *Balanite* by its insipid epunctuate leaves, its insertion of gynæceum, and its drupaceous fruit; whence better perhaps connected with *Burseraceæ*.

[3] Spec. 2 (v. 3, 4, quar., of which 2 are imperfectly known). Oliv., *Fl. Trop. Afr.*, i. 313.—Walp., *Ann*, vii. 541.

[4] *Dict.*, i. 449.—J., *Gen.*, 429.—DC., *Prodr.*, i. 335 (*Polygaleæ*).—A. S. H., et Moq., in *Mém. Mus.*, xix. 334.—Endl., in *Ann. Wien. Mus.*, i. 188, t. 16, ... 1838.—B. H., *Gen.*, 313, n. 22.—*Cardiocarpus* Reinw., in *Syll. Pl. Ratisb.*, ii. 14. — *Cardiophora* Benth., in *Hook. Lond. Journ.*, ii. 216.

[5] Minute.

[6] Species about 8, 1 of Molucca (*Rex amaroris* Rumph.), most of warm southern regions. Hassk., in *Bull. Soc. Bot. de Fr.*, x. 374.—Br. & Gr., in *Ann. Sc. Nat.*, sér. 5, iii. 229; in *Nouv. Arch. Mus.*, iv. t. 37.—Walp., *Ann.*, i. 168; vii. 541.

[7] *Unit. St. Expl. Exped., Bot.*, 337, t. 40.—B. H., *Gen.*, 314, n. 23.

soon unequally capitate, stigmatiferous, hence sulcate. "Drupe dry, nuciform, ovoid, subcompressed; putamen osseous; seed amphitropous, exalbuminous; embryo fleshy; cotyledons ovate, flat; radicle very short, superior."—Very bitter small trees; leaves alternate, simple, elongated, entire, petiolate; flowers[1] in axillary compound racemes[2] (*Fiji Islands*[3]).

111? **Kœberlinia** Zucc.[4]—Flowers hermaphrodite; receptacle shortly conical. Sepals 4, small, free, imbricated, deciduous. Petals same in number, alternate, convolute-imbricate, deciduous. Stamens 8, 2-seriate; filaments free; anthers ovate, introrsely 2-rimose. Germen stipitate, 2-locular; style subulate, obtuse stigmatiferous at apex; ovules ∞, inserted on dissepiment, ∞-seriate, descendent or subtransverse. Fruit subbaccate, subglobose, apiculate with persistent style; pericarp thinly fleshy, interior pulpy, oligospermous. Seeds descending, "carinate-cochleate; testa crustaceous, rugulose-striolate; albumen thin; embryo annular; radicle superior."—A subaphyllous shrub, ramified, eglandular, glabrous; branches crowded, spinescent; leaves alternate, minute, squamiform, caducous; flowers[5] in short racemes placed below apex of lateral branches[6] (*Texas, Mexico*[7]).

X. CNEOREÆ.

112. **Cneorum** L.—Flowers hermaphrodite, 4- or oftener 3-merous; receptacle shortly columnar, exterior glandular. Sepals small, more or less connate at base, persistent, in præfloration not contiguous. Petals same in number, longer, imbricated, caducous. Stamens equal in number to petals, and alternate with them; filaments inserted in pits of disk, free, subulate; anthers introrse, 2-rimose. Germen placed at summit of receptacle; cells prominent, opposite petals, equal in number to them; style central,

[1] Small.

[2] A genus scarcely distinct. Is it not rather a form of *Soulamea*; second cell of germen abortive?

[3] Spec. 1. *A. soulamoides* A. Gray, *loc. cit.*

[4] In *Flora* (1832), *Beibl.*, ii. 73, 74; in *Münch. Densk.* (1838), 358.—Endl., *Gen.*, n. 5670.—B. H., *Gen.*, 315, n. 30

[5] Small, white.

[6] A genus enumerated at the end of *Pittosporum* (Endl.) or *Simarubea* (B. H.). It also appears somewhat allied to *Zygophyllum*.

[7] Spec. 1. *K. spinosa* Zucc., *loc. cit.*—A. Gray, *Pl. Wright.*, i. 30; ii. 26.—Walp., *Rep.*, i. 258.

erect, dilated stigmatiferous 3-lobed at apex; ovules in each cell 2, descendent, sometimes separated by false incomplete septa, campylotropous; micropyle extrorse, superior. Fruit drupaceous; cocci 3, 4, subglobose, drupaceous; mesocarp thin; putamen osseous, sometimes 2-locellate by false oblique septa; locelli superposed, 1-spermous. Seeds descendent from oblique funicle, uncinate-conduplicate; albumen fleshy; embryo uncinate-hypocrepiform; cotyledons elongated, semiterete incumbent; radicle superior, terete.— Rather bitter unarmed small shrubs, glabrous or pubescent with hairs affixed at middle; leaves small, simple, entire, elongated, coriaceous, epunctuate or at margin pellucid-punctulate; articulate, exstipulate at base; flowers axillary, solitary or scantily cymose; peduncle more or less adnate to petiole; pedicels articulate below flower (*Medit. Reg., North-West. Ins. Africa*). See p. 421.

XI. ZYGOPHYLLEÆ.

113. **Zygophyllum** L.—Flowers 4–5-merous; sepals imbricated, deciduous or persistent. Petals shortly unguiculate; præfloration imbricated or contorted. Stamens 8–10, inserted round small glandular angular or more rarely cupuliform disk, sometimes suboblique; filaments free, exserted, with squamule inserted inwardly above base, sometimes wanting (*Rœpera*). Germen sessile or shortly and thickly stipitate, 4, 5- or more rarely 2, 3-agonal; cells same in number as petals, placed before them; ovules in each cell 2–∞, 2-seriate, descending; micropyle extrorse, superior; raphe more or less prominent or partly free; style angular, tapering, stigmatiferous, not thickened at apex. Fruit 2–5-agonal or 2–5-pterous, subcapsular, scarcely dehiscent or with septicidal or loculicidal dehiscence; endocarp sometimes solute. Seeds 1–∞; testa crustaceous; embryo scantily albuminous; cotyledons oblong; radicle superior. — Undershrubs or small shrubs, often prostrate; branches terete or angular, sometimes spinescent; leaves opposite, 2- or more rarely 1-foliolate; folioles opposite, flat, unsymmetrical (*Fabago, Rœpera*), or more rarely terete (*Agrophyllum*); stipules 2, lateral, often spinescent; flowers situated nearly at axil of stipules and lateral to them, 1 or 2, unequal in age (*Asia, South Africa, Australia, N. America.*) See p. 422.

114. **Fagonia** T.[1]—Flowers nearly of *Zygophyllum;* sepals 5, imbricated, deciduous. Petals 5, imbricated, caducous. Stamens 10, inserted below small disk; filaments naked, slender; anthers shortly oblong, introrsely 2-rimose. Germen sessile, 5-agonal; cells 5, oppositipetalous; style subulate, 5-agonal, simple, stigmatiferous at apex; ovules in each cell 2, inserted at base of internal angle, collaterally ascending; micropyle introrse or sublateral, inferior. Fruit capsular, pyramid-5-agonal; cocci 5, finally solute from axis, inwardly dehiscent; endocarp corneous, separating; seeds solitary in cells, erect, compressed, widely oblong; testa mucilaginous; albumen coriaceous; embryo straight; cotyledons flat, wide ovate.—Ramified herbs, sometimes suffrutescent at base, diffuse or prostrate, glabrous or with short hairs, often tuberculate at apex, somewhat hispid; leaves opposite 1–3-foliolate; folioles entire, mucronate; stipules usually spinescent; flowers[2] lateral to leaves, pedunculate (*East. Med. Reg. South Africa, Temp. America*[3]).

115. **Seetzenia** R. Br.[4]—Flowers hermaphrodite, apetalous, usually 5-merous; receptacle shortly convex. Sepals linear-oblong, valvate incurved at apex. Stamens equal in number to sepals, opposite them; filaments inserted below small lobed disk, free; anthers subglobose introrsely or sublaterally rimose. Germen sessile, oblong clavate, rather fleshy, truncate 5-locular; styles 5, short radiating, capitellate stigmatiferous at apex; ovules solitary in each cell, descending; micropyle extrorse superior. Capsule elongate-ovoid, with 5-cocci; cocci solute from axis; exocarp narrow separating from crustaceous endocarp inwardly and at excised apex; columella persistent rigid, dilated 5-dentate at apex; seeds solitary descending ovate, compressed; testa thick; albumen thin; embryo subequal; cotyledons subelliptical rather thick; radicle cylindrical superior.—Rather small prostrate herbs, suffrutescent at base, glabrous or woolly; leaves opposite stipulate, 3-foliolate; folioles obovate apicu-

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[1] *Inst.*, 265, t. 141.—*Gen.*, n. 531. — J., *Gen.*, 296.—Gærtn., *Fruct.*, ii. 153, t. 113.—Lamk., *Dict.*, ii. 447; Suppl., ii. 628; *Ill.*, t. 346. — Shaw, *Afric.*, 229. — Forsk., *Descr. Æg.-Arab.*, n. 68.—DC., *Prodr.*, i. 704.—A. Juss., in *Mém. Mus.*, xii. 453, t. 24, fig. 2.—Endl., *Gen.*, n. 6034. — R. H., *Gen.*, 267, n. 10.

[2] Pink, violet, or sometimes yellowish.

[3] Spec. 4, 5 (enumer. ad 25). Wight, *Ill.*, t. 64.—C. Gay, *Fl. Chil.*, i. 468. — Harv. & Sond., *Fl. Cap.*, i. 356.—Del., *Fl. Ægypt.*, t. 27, fig. 2. t. 28, figs. 2, 3.—Boiss., *Fl. Or.*, i. 914.—Walp., *Rep.*, 494; ii. 822; v. 385; *Ann.*, i. 149; ii. 244; iv. 404.

[4] In *Denh., Oudn. et Clapp. Voy. App.*, 231.—Endl., *Gen.*, n. 6042.—B. H., *Gen.*, 266, n. 6.

late; flowers minute subaxillary, solitary; fructiferous peduncle pendulous (*Warm Africa, South-West. Asia*[1]).

116. **Peganum** L.—Flowers 4–5-merous; sepals usually foliaceous narrow entire or pinnatifid; præfloration subvalvate, slightly imbricated or open. Petals entire subequal, imbricated or contorted, finally patent. Stamens 3 times more than petals inserted round usually smooth disk; filaments dilated at base, sometimes antherless; anthers linear, introrsely 2-rimose. Germens sometimes shortly stipitate; cells 2, 3; ovules ∞, inserted at internal angle, oblique anatropous; style erect, sometimes more or less bent, 2, 3-angular-carinate; keels papillose stigmatiferous. Fruit subglobose furnished with base of persistent calyx, usually dry, 2, 3-valved (*Eupeganum*), sometimes baccate, indehiscent (*Malacocarpus*); endocarp papyraceous, adherent. Seeds ∞; testa outwardly spongy scrobiculate; albumen fleshy; embryo curved.—Ramified inodorous herbs, not glandular-punctuate, glabrous or pubescent; stems terete; leaves alternate, entire, irregularly pinnatifid; stipules lateral setaceous, unequal; flowers pedunculate, solitary, leaf-opposed (*Med. Reg. West. Cent. and Trop. Asia, Mexico*). See p. 427.

117. **Tribulus** T.—Flowers hermaphrodite; receptacle convex. Sepals 5, imbricated, deciduous or persistent. Petals same in number, imbricated or contorted, deciduous. Stamens 10, 2-seriate, of which the 5 alternipetalous longer, outwardly enlarged with gland at base; filaments free, naked, inserted below 10-lobed disk; anthers introrse, 2-rimose. Germen superior sessile adpressed, hirtus; cells 5, oppositipetalous, or more rarely 6–12, sometimes ∞-locellate with oblong or transverse septa; style filiform or pyramidal, stigmatiferous 5–12-lobed at apex; ovules in each cell 1–∞, finally superposed, usually oblique descending; micropyle extrorse superior. Fruit of 5–12-cocci; cocci finally solute from sometimes thick pyramidal columella, corneous or osseous, dorsally winged, spinose aculeate or tuberculate, usually indehiscent; seeds descending,

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[1] Spec. 1. *S. prostrata.* — *S. africana* R. Br., *loc. cit.*—Harv. & Sond., *Fl. Cap.*, i. 366.—Oliv., *Fl. Trop. Afr.*, i. 288.—Boiss., *Fl. Or.*, i. 916.—Walp., *Rep.*, i. 498.—*S. orientalis* Dcne., in *Ann. Sc. Nat.*, sér. 2, iii. 281, t. 7.—*Zygophyllum prostratum* Thunb., *Fl. Cap.*, 543 (ex Sond.).— ? *Z. lanatum* W., *Spec.*, ii. 564 (doubtfully from R. Br., from woolly articulation and long filiform style, as described by authors).—DC., *Prodr.*, i. 706, n. 19.

usually solitary in cells; embryo exalbuminous; cotyledons ovate, radicle superior, short.—Loose ramified nodose usually sericeous-pilose herbs; branches usually prostrate articulate; leaves opposite, one in each pair smaller, or aborted alternately, abrupt pinnate stipulate; flowers lateral to leaves, pedunculate (*All Warm Regions*). See p. 425.

118? **Sisyndite** E. Mey.[1]—"Flowers (nearly of *Tribulus*) 5-merous; sepals unequal, imbricated. Petals 5, a little longer. Disk 5-lobed, crowned with 5 scales, hypogynous, 3-fid or lacerate, opposite lobes. Stamens 10; filaments subulate, of which 5 are inserted between scales and lobes of disk; other 5 alternate. Germen sessile, 5-locular; ovules solitary in each cell descending; style stigmatiferous clavate, 5-sulcate at apex. Capsule plumose-hirsute; cocci 5, finally dehiscing by ventral suture; seeds exalbuminous.—A spartioid glabrous shrub; branches terete, spongy subaphyllous, 2-chotomous; leaves opposite, stipulate pinnate; folioles few subopposite coriaceous; flowers[2] axillary (?) solitary pedunculate" (*Cape of Good Hope*[3]).

119. **Augea** Thunb.[4] — Flowers hermaphrodite; receptacle (?) obconical concave. Sepals 5, inserted at margin, unequal membranous-marginate, imbricated, persistent. Disk urceolate central shortly stipitate, submembranous, subulate-10-dentate at margin, bearing 10 stamens alternating with teeth and 10 scales opposite stamens, exterior. Scales membranous, 3-fid, narrow at base.[5] Staminal filaments obcuneate, 3-fid; lobes antheriferous at middle; anthers oblong, introrsely 2-rimose; connective produced beyond cells in short glands. Germen central, 10-locular; style short thick obtusely 10-sulcate, subentire stigmatiferous at apex; ovules in each cell 2–4, obliquely ascending. Capsule oblong, 10-costate, 10-valved; seeds solitary in cells, oblong; embryo exalbuminous; cotyledons flat, rather thick.—Annual fleshy glabrous herbs;[6] root fusiform; branches articulate; leaves opposite, stipulate, connate simple,

[1] In *Herb. Dreg.* (ex Harv. & Sond., *Fl. Cap.*, i. 354).—B. H., *Gen.*, 265, 998, n. 2.

[2] "Magnis, luteis."

[3] Spec. 1. *S. spartea* E. Mey., *loc. cit.*—Harv., *Thes. Cap.*, t. 120.—Walp., *Ann.*, vii. 479.

[4] *Fl. Cap.*, 389 (nec Retz.).—Spreng., *Gen.*, n. 1875.—Endl., *Gen.*, n. 6742.—B. H., *Gen.*, 265, n. 3.

[5] Perhaps petals or staminodes exterior to fertile stamens reduced to filaments.

[6] *Mesembrianthemums*, or with habit and leaves of some *Portulacacæ*.

semiterete obtuse; flowers axillary or sublateral solitary (or in scanty cymes); pedicels 2-bracteolate at base (*Cape of Good Hope*[1]).

120? **Sericodes** A. Gray.[2]—"Flowers 5-merous; sepals ovate-lanceolate, persistent. Petals rhomboid-ovate, late deciduous. Stamens 10, subperigynous; filaments free; alternipetalous, inwardly enlarged at base with scales, 2-fid; anthers oblong. Germen sessile very villous, 5-lobed, 5-locular; style 5-agonal clavate above; angles stigmatiferous; ovules solitary descendent. Fruit dry, very villous; cocci 5, coriaceous, separating from axis indehiscent; seed descending; embryo exalbuminous; cotyledons ovate.—A much ramified humble shrub; leaves small simple fasciculate (fascicles alternate) sessile oblong-spathulate entire, sericeous; stipules minute spinescent; flowers[3] 1–3 in the same fascicle as the leaves, shortly pedicellate" (*North Mexico*[4]).

121. **Guaiacum** Plum.[5]—Flowers 4–5-merous; sepals imbricated, deciduous. Petals 4, 5, more or less unguiculate, imbricated, deciduous. Stamens 8–10; filaments naked (*Euguaiacum*), or inwardly at base furnished with membranous squamules (*Porlieria*,[6] *Larrea*,[7] *Guiacidium*[8]), or more or less thick fleshy (*Bulnesia*,[9] *Pintoa*[10]), simple or more or less lacerate; anthers introrse, 2-rimose. Germen free, inserted at summit of receptacle beyond insertion of androceum short (*Pintoa, Larrea, Porlieria*) or more or less elongated (*Euguaiacum, Bulnesia*); cells 2, 3, or 4, 5, opposite petals, style subulate stigmatiferous subentire at apex, or scarcely dilated or lobed; ovules in

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[1] Spec. 1, salsuginosa. *A. capensis* Thunb., *loc. cit.* — Harv., *Gen. S.-Afr. Pl.*, 409. — Harv. & Sond., *Fl. Cap.*, i. 355.

[2] *Pl. Wright.*, i. 28, not.—B. H., *Gen.*, 265, n. 4.

[3] "Flavis."

[4] Spec. 1. *S. Greggii* A. Gray, *loc. cit.*—Walp., *Ann.*, iv. 403.

[5] *Gen.*, t. 17.—L., *Gen.*, n. 518.—J., *Gen.*, 296.—Lamk., *Dict.*, ii. 614; Suppl., ii. 712; *Ill.*, t. 342.—Gærtn., *Fruct.*, ii. 148, t. 113.—DC., *Prodr.*, i. 706.—A. Juss., in *Mém. Mus.*, xii. 456, t. 16, fig. 7.—Spach, *Suit. à Buffon*, ii. 309.—Endl., *Gen.*, n. 6041.—A. Gray, *Gen. Ill.*, t. 148, 149.—Ag., *Theor. Syst.*, t. 18, figs. 11, 12.—B. H., *Gen.*, 267, n. 12.—H. Bn., in *Adansonia*, x. 315 (incl.: *Bulnesia* C. Gay, *Guiacidium* A. Gray, *Larrea* Cav., *Pintoa* C. Gay, *Porlieria* R. & Pav.).

[6] R. & Pav., *Prodr.*, 55, t. 9.—DC., *Prodr.*, i. 707.—A. Juss., in *Mém. Mus.*, xii. 457, t. 16, fig. 6.—Spach, *Suit. à Buffon*, ii. 308.—Endl., *Gen.*, n. 6039.—B. H., *Gen.*, 268, n. 13.

[7] Cav., in *Ann. Cienc. Nat.*, ii. 199, t. 18, 19; *Icon.*, vi. 39, t. 359, 360.—DC., *Prodr.*, i. 705.—A. Juss., in *Mém. Mus.*, xii. 456, t. 15, fig. 5.—Endl., *Gen.*, n. 6038.—A. Gray, *Gen. Ill.*, t. 147.—B. H., *Gen.*, 267, n. 11.

[8] A. Gray, *Gen. Ill.*, ii. 121, t. 149.

[9] C. Gay, *Fl. Chil.*, i. 474, t. 15.—B. H., *Gen.*, 268, n. 16.—*Gonoptera* Turcz., in *Bull. Mosc.* (1846), i. 150.

[10] C. Gay, *loc. cit.*, 479, t. 16.—B. H., *Gen.*, 269, n. 17.

cells 4–∞, 2-seriate descendent; micropyle extrorse superior. Fruit coriaceous, usually outwardly scarcely fleshy; cocci 2–5, dry or subdrupaceous (*Euguaiacum*), dorsally obtuse (*Larrea*), carinate or more or less wide-winged (*Euguaiacum*), sometimes dorsally membranous (*Bulnesia*), glabrous, or more rarely villous (*Larrea*), finally separating from axis, indehiscent (*Larrea*), septicidal (*Euguaiacum, Pintoa*), or inwardly dehiscing (*Porlieria, Bulnesia*). Seeds usually solitary in cocci; testa thin; embryo axile (often green); cotyledons more or less elongated; albumen fleshy, or more or less hard or corneous, outwardly smooth or slightly rimose (*Euguaiacum*).—Resinous or balsamic trees or shrubs, some spartioid (*Bulnesia*); wood often hard; branches nodose articulate; leaves opposite stipulate, pinnate, 2–∞-foliolate; folioles entire (sometimes sensitive) unsymmetrical at base; flowers[1] solitary or cymose few, pedunculate lateral to leaves (*Trop. and Subtrop. Temp. and Mont. America*[2]).

122? **Plectrocarpa** Gill.[3]—"Flowers often irregular; sepals 5, concave, imbricated. Petals 5, spathulate, unguiculate, slightly longer than calyx, open in æstivation. Stamens 10; filaments filiform or subulate, free at base or enlarged on both sides by subulate squamules and scales fleshy fimbriate-lacerate stipate; anthers oblong, introrsely rimose. Germen sessile densely villous, ovoid-5-agonal, 5-locular; style subulate stigmatiferous at apex; ovules in each cell 2, descending, laterally inserted by funicle at middle of cell. Fruit villous subulate-5-agonal or rather terete; cocci 5, indehiscent, middle of back produced in subulate spur. Seed solitary in cells, descending compressed; albumen thin fleshy; embryo axile; cotyledons ovate foliaceous.—A ramified shrub; branches terete spinose at nodes; spines strong straight, 4-partite; leaves fasciculate at nodes, imparipinnate; folioles oblong sericeous 4, 5-jugate; flowers[4] solitary, pedunculate, erect between fascicles of leaves" (*Mendoza*[5]).

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[1] Yellow, purple, or bluish, often large, handsome.

[2] Spec. ad 18. Lindl., in *Bot. Reg.* (1839), t. 9.—C. Gay, *loc. cit.*, 471 (*Larrea*), 476 (*Porlieria*).—A. Gray, *Pl. Wright.*, 28 (*Porlieria*).—H. Bn., in *Adansonia*, x. 315 (*Porlieria*).—Walp., *Rep.*, v. 386 (*Larrea*); *Ann.*, i. 151 (*Bulnesia*), 153 (*Pintoa*); iii. 840; iv. 406; 481, 482 (*Porlieria*).

[3] In *Hook. Bot. Misc.*, iii. 166.—Endl., *Gen.*, n. 6040.—B. H., *Gen.*, 268, n. 15.

[4] "Dense villosis."

[5] Spec. 1. *P. tetracantha* Gill., *loc. cit.*—Walp., *Rep.*, i. 498.

123. **Chitonia** Moç. & Sess.[1]—Flowers 4-merous ; sepals unequal, imbricated, deciduous. Petals alternate large, shortly obovate, imbricated. Stamens 8, 2-seriate, shorter than petals; filaments naked; anther sericeo-barbate introrse, 2-rimose. Germen 4-agonal, tapering above in subulate style, stigmatiferous widely 4-lobed at apex; cells 4, opposite petals; ovules in each 2, descending. Capsule widely 4-winged, septicidally 4-valved ; seeds in cells 1, 2 ; raphe crested; albumen fleshy ; cotyledons of (green) embryo, oblong. —A sericeous shrub; branches alternate; inferior leaves alternate, superior opposite, imparipinnate; folioles 3–∞, opposite entire; stipules subulate ; flowers[2] solitary or scantily cymose, pedunculate, lateral to leaves (*Mexico*[3]).

XII. NITRARIEÆ.

124. **Nitraria** L.—Flowers hermaphrodite; receptacle convex. Sepals 5, more or less high connate, rather fleshy, imbricated, persistent. Petals same in number, alternate, longer, cucullate induplicate valvate at apices. Stamens 5–15, inserted under very inconspicuous disk ; filaments free, naked, anthers introrse, 2-rimose. Germen free, sessile, sericeous oblong-pyramidal, 2–6-locular, gradually attenuated into short style, stigmatiferous decurrent-2–6-lobed at apex; ovules solitary in cells depending from elongated funicle descending; micropyle extrorse superior. Drupe subbaccate ovate-acuminate ; mesocarp usually thin ; putamen bony, exterior sulcate or scrobiculate, 6-valved at apex alternate shorter, dehiscent, 1-spermous. Seeds descending ; testa membranous ; epidermis dry ; embryo exalbuminous; cotyledons plano-convex; radicle short superior.— Rigid spinose or unarmed shrubs, usually canescent ; leaves alternate or fasciculate, simple, obovate-cuneate entire or at apex 3–5-fid; stipules small lateral; flowers in more or less ramified scorpioid cymes, shortly pedicellate (*West Asia, North Africa, and Coast of Australia*). See p. 430.

[1] Ex DC., *Prodr.*, i. 707.—Endl., *Gen.*, n. 6032.—B. H., *Gen.*, 268, n. 14.

[2] Large, rose-violet.

[3] Spec. 1. *C. mexicana* Moç. & Sess., *loc. cit.*—Zucc., *Nov. Stirp. Fasc.*, i. 355, t. 17.—Walp., *Rep.*, i. 493.

XIII ? CORIARIEÆ.

125. **Coriaria** Nissol.—Flowers regular, hermaphrodite or polygamous; receptacle depressed conical. Sepals 5, imbricated persistent. Petals 5, alternate, usually shorter than sepals, interior carinate, fleshy, accrescent after anthesis. Stamens 10, 2-seriate; filaments usually free, or sometimes 5 (exterior) adnate to keel of petals, hypogynous or subhypogynous; anthers (effete in female flower) introrse, 2-rimose. Carpels 5, alternipetalous, or more rarely 6–10 free, inserted at summit of receptacle. Germen free (effete in male flower); styles same in number; free, long, flexuous, everywhere stigmatiferous; ovules solitary in cells descending; micropyle introrse superior. Fruit of 5–10 cocci, included in fleshy petals, finally compressed to solute receptacle, scarcely drupaceous, finally dry; seeds descendent; testa membranous; albumen ? thin membranous, sometimes hard; embryo ovate compressed fleshy; cotyledons plano-convex; radicle short superior.—Unarmed shrubs, sometimes sarmentose; branches angular; buds squamose; leaves opposite or 3-nate, entire, 1–5-nerved, exstipulate; flowers axillary, solitary or in racemes sometimes densely flowered; pedicels bracteate, or sometimes folio-stipitate (*Med. Reg. Temp. Asia, South-West. America, and N. Zealand*). See p. 432.

XIV. SURIANEÆ.

126. **Surianea** Plum.—Flowers hermaphrodite; receptacle subplane at apex. Sepals 5, imbricated, persistent. Petals same in number alternate, very short unguiculate, imbricated or contorted. Stamens 19, 2-seriate; filaments free; anthers short sub-2-dymous, introrsely rimose (in shorter stamens), oppositipetalous, sometimes wanting. Carpels 5 opposite petals, free; germen shortly stipitate, 1-locular; style inserted at base of internal angle, slightly thickened, stigmatiferous at apex; ovules in cells 2, collateral, descending, very incompletely anatropous; raphe very short introrse inferior; micropyle extrorse superior. Fruit-carpels 5 (or fewer) furnished with persistent styles and calyx, drupaceous; mesocarp thin rather fleshy; putamen 1-locular; seed ascendent rather compressed, campylotropous; embryo exalbuminous uncinate; cotyledons rather flat,

incumbent; radicle conical, superior to hilum, descendent.—An insipid ramified shrub, velvety with capitate hairs; branches terete; leaves alternate collected sessile, articulate at base, linear-spathulate, obtuse, subnerved entire rather thick, pellucid-punctuate; flowers in few-flowered racemose cymes at summit of fasciculate twigs (*All Trop. Sea-coasts*). See p. 434.

ERRATA.

Page 176, *for* "Cardodiptera" *read* "Carpodiptera."

,, 202, note 1, *for* "Belotian" *read* "Belotia."

,, 318, *for* "Ruhlia" *read* "Kuhlia."

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